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ROSS'
CELEBRATED LENSES.

THE

BRITISH JOURNAL
Photographic Almanac

AND

Photographer's Daily Companion

1898.

EDITED BY THOMAS BEDDING, F.R.P.S.

CONTENTS INDEX, 1083-1088.
INDEX TO ADVERTISERS, 1133-1136.

306389
Rd. 11.34

PRICE ONE SHILLING NET.

Cloth, Eighteenpence Net.

KODAK Price List. See pages 319 to 326

ROSS, Limited, 111 NEW BOND STREET.
Manufactory—Clapham Common, London, S.W. [See pages 25-93.

ROSS' CARTE AND CABINET LENSES GIVE FINEST DEFINITION WITH EXTREME RAPIDITY.

ROSS, ROSS-ZEISS, RCSS-GOERZ LENSES TAKE THE LEAD EVERYWHERE

LONDON: HENRY GREENWOOD & CO., PUBLISHERS, 24 WELLINGTON STREET STRAND.
PARIS: BOYVEAU & CHEVILLET, 22 Rue de la Banque. NEW YORK: C. GENNERT, 26 East 13th St.
MELBOURNE: BAKER & ROUSE, J. W. SMALL & CO., WATSON & SONS.
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W. W. ROUCH & Co.

(ESTABLISHED 1854),

Photographic Chemists and Makers of High-class Apparatus.

PRIZE MEDALS AND AWARDS.

London, 1862 | Dublin, 1865 | Paris, 1867 | Bristol, 1881 | London, 1885 | Dundee, 1886
Crystal Palace, 1888.

SILVER MEDAL AT THE INTERNATIONAL INVENTIONS EXHIBITION AWARDED TO

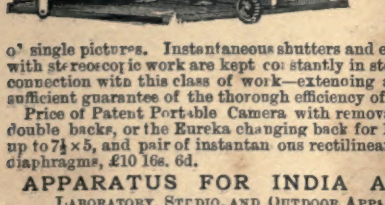
ROUCH'S PATENT PORTABLE CAMERA,

Which is unquestionably the LIGHTEST and MOST PORTABLE Landscape Camera of first-class workmanship in the Market. It is only necessary to compare the weight and bulk of this instrument with those of any other Camera presenting the same advantages in the matter of strength, convenience, and completeness of working parts and general utility, to prove that it is *par excellence* the Camera for general out-door use. It is provided with every possible motion desirable in a high-class camera, is of the best material and highest class of workmanship, and has been used by hundreds of the best Photographers since its introduction.

Prices, with One Double Back and Reversing Frame:						Extra Backs.		
For Plates 6½ by 4¼	...	...	5	8	6	...	£1	2 0
,, 7½ by 5	...	...	5	13	6	...	1	3 6
,, 8½ by 6½	...	...	6	18	6	...	1	7 0
,, 10 by 8	...	...	6	18	0	...	1	12 0
,, 12 by 10	...	...	8	3	0	...	2	0 0
,, 15 by 12	...	...	10	10	0	...	2	10 0

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ADAPTED FOR STEREOSCOPIC WORK.



Since the revival commenced in Stereoscopic Photography, W. W. Rouch & Co. have been commissioned to supply several complete sets, arranged for the exclusive practice of this interesting branch of the art. The PATENT PORTABLE CAMERA lends itself readily to the purpose; its front, unlike those of most of the modern 'portable' instruments, affording ample space for the necessary twin lenses. Fitted with removable central partition, the various sizes of Camera, from half to whole plate, are arranged for stereoscopic work, and are at the same time equally available for the production of single pictures. Instantaneous shutters and every appliance requisite in connection with stereoscopic work are kept constantly in stock, and W. W. ROUCH & Co.'s long connection with this class of work—extending as it does as far back as 1854—is a sufficient guarantee of the thorough efficiency of every article supplied.

Price of Patent Portable Camera with removable central partition, extra front, 3 double backs, or the Eureka changing back for 12 plates, any of the stereoscopic sizes up to 7½ × 5, and pair of instantaneous rectilinear doublets accurately paired, with iris diaphragms, £10 16s. 6d.

APPARATUS FOR INDIA AND HOT CLIMATES.

LABORATORY, STUDIO, AND OUTDOOR APPLIANCES OF EVERY DESCRIPTION.

W. W. ROUCH & Co., Manufacturers of High-class Photographic Apparatus,
161 Strand, London, W.C., Next Door to King's College.

[*See following page, and pages* 1400, 1401.

ROUCH'S 'EUREKA'

(Medal at the Crystal Palace Exhibition).

THE PIONEER OF HAND CAMERAS.

Is used by the Special Artists of 'The Graphic,' 'Illustrated London News,' 'Black & White,' 'Country Life,' &c., &c.

The most compact and workmanlike Camera ever introduced. Can be adapted for 24 cut films, as well as 12 glass plates. Is now made up-to-date, with Iris Diaphragm to lens, Thornton-Pickard Adjustable Shutter, and Automatic Register to changing back—at the old prices, viz. :—

QUARTER-PLATE, £6 12s. 6d. 5 by 4 ... £8 10s.
HALF-PLATE ... ... £12 12s.

The following Testimonial speaks for itself :—

TESTIMONIAL 'EUREKA.'

'You will be interested to learn that, in spite of many and numerous other varieties being in use here, I was able to secure the Medal, at the last Exhibition, for photographs of objects in motion, with the "Eureka."'

T. C. DOWNING, Esq.,
Hon Treas. Photographic Society of India, Culcutta.

ROUCH'S 'EXCELSIOR.'

This instrument surpasses all other Cameras of the hand class in the wide range of its powers, combining as it does a perfect Hand Camera with an equally efficient one for use on a tripod stand for general purposes. Notwithstanding the perfection to which the Hand Camera has recently been brought, and despite the fact that many of the best of such instruments are capable of more extended work, there is a growing demand for an even more comprehensive range of power, to meet which the 'Excelsior' has been designed.

Price of the 'Excelsior' (patent) Hand Camera, with two Lenses, Double Rising Front, Rack and Pinion Focussing Adjustment, Thornton-Pickard Adjustable Shutter, Detachable Changing Back, and Automatic Register, complete for plates—

4½ by 3½ ... ... £12 12s. 5 by 4 ... ... £14 14s.
HALF-PLATE ... ... £17 17s.

ROUCH'S STEREOSCOPIC HAND CAMERA.

For Twelve Stereoscopic Negatives or Twenty-four Lantern Size.

Sizes, 6½ × 3½ or 6½ × 4¼.



To meet the growing requirements for a Hand Camera by means of which pictures may be made for the Stereoscope, W. W. Rouch & Co. have introduced the present instrument. It is fitted with a pair of accurately adjusted lenses and Thornton-Pickard Adjustable Shutter. A circular level is attached to the instrument in order to ensure the perfect accuracy of adjustment. If desired, two lantern pictures, 3¼ × 3¼, may be taken on the plate instead of one stereoscopic. The plates are carried in Rouch's Patent 'Eureka' Changing Back, with automatic register. Price complete, with one pair of lenses, fitted with Iris Diaphragms, finder, circular level, &c., **£12 12s.**

Purest Chemicals and Preparations. High-class Apparatus of every description.

Prize Medals and Awards at the principal International Exhibitions.

W. W. ROUCH & CO., Contractors to Her Majesty's Government,
Next Door to King's College, 161 STRAND, LONDON, W.C.

[*See preceding page.*

MARION'S

PLATES

AND

FILMS

MANUFACTURED AT

THEIR WORKS,

SOUTHGATE,

MIDDLESEX.

Warehouse and Showrooms:

22 & 23 Soho Square, LONDON.

[*See following pages*

MARION'S
PLATES AND FILMS

Ordinary	Average Speed	40	H.&D.
Portrait	„	80	„
'P. S.' For Pyro Soda Developer ...	„	80	„
Instantaneous ...	„	120	„
Process. For all Process Work			

ALL ONE PRICE.

½-plate, 2/3 per dozen.

Other Sizes in Proportion.

Academy Landscape	„	40 „
Academy Portrait	„	80 „
Academy Instantaneous		120 „

EXTRA RICH IN SILVER.

Extra price, ½-pl., 3/8 per dozen.

Other Sizes in Proportion.

MARION'S LANTERN PLATES.

Gelatino Chloride (slow). For Contact Printing
Chloro Bromide (quick). For Reductions ... } 3¼ × 3¼ ... 1/- per dozen.

Other Sizes in Proportion.

FILMS.—Ordinary Thickness.

Ordinary Rapidity ... ...
Instantaneous Rapidity ... ... } 4¼ × 3¼ ... 1/6 per dozen.
Academy (extra rich in Silver) ... „ ... 2/- „

Other Sizes in Proportion.

FILMS.—Extra Thick Celluloid.

Ordinary or ... ...
Instantaneous ... ... } 4¼ × 3¼ ... 3/- per dozen.
Academy (extra rich in Silver) ... ... „ ... 3/6 „

Other Sizes in Proportion.

Full List of Sizes and Prices Free on Application.

22 & 23 SOHO SQUARE, LONDON, W.

[See preceding and following pages.

MARION & CO.'S

MOUNTS.

Manufactured at their Factory— } *Courbevoie, near Paris.*

WE *send Samples of Mounts free to the Trade upon receipt of Business Card. Photographers desirous of being posted in Novelties will do well to write us.*

MARION & CO., 22 & 23 Soho Square, London, W.

[*See preceding and following pages.*

— MARION & CO.'S —

CHRISTMAS, Birthday, and Souvenir

WITH OR WITHOUT MOTTOES.

MOUNTS.

Extract from the 'British Journal of Photography,' Sept. 10th, 1897

'CHRISTMAS MOUNTS.

'MARION & CO.,' SOHO SQUARE, W.

'A large assortment of Mounts suitable for Christmas and New Year's photographic cards has been sent us by Messrs. Marion & Co. The Mounts are made suitable for attaching the photographs by means of an adhesive, and for "slipping in." Messrs. Marion's assortment this season is larger than ever, sizes being provided for pocket Kodak, midgets, C.-de-V., quarter-plate, cabinet, and half-plate, and either for upright or oblong. Artistic refinement characterises the designs and colours of these Mounts, which should be in high favour among photographers cultivating the photographic Christmas Card as an aid to business.'

Our 1898 Christmas Mounts. Samples will be ready in May.

TABER'S BAS RELIEF.

A Platinotype Photograph finished in Bas Relief, in which the figure is raised from the Background and mounted similar to a Plaque or Medallion. Sizes of Pictures, 5½ in. circular and 8 × 6 square. *Sample Pictures, either size,* **10s.**

Sole Agents: MARION & CO., 22 & 23 Soho Square, LONDON, W.

[See preceding and following pages.

A NEW PRINTING-OUT PAPER

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In three Grades—

GLOSSY, MATT, and GROS GRAIN.

GLOSSY and MATT, 15/- per Quire.

In packets, 1/- each.

GROS GRAIN, 25/- per Quire.

In packets, 1/8 each.

MARION'S FERRO-PRUSSIATE PAPERS AND LINEN.—White lines on blue ground. In rolls and cut sizes.

MARION'S CYANOGRAPHIC PAPER.—Blue lines on white ground.

MARION'S MELAGRAPHIC PAPER.—Black lines on white ground.

MARION'S GALLATE DE FER PAPER.—Black lines on white ground.

GLENFIELD PHOTO STARCH.—Undoubtedly the very best mountant for photographs. The starch used by the profession. Sample tins **6d.** each. MARION & CO., Sole Wholesale Agents.

KING'S SOLUTION for removing silver stains from unvarnished negatives. Has been the means of saving thousands of negatives. In bottles **1/-** and **2/6** each. MARION & CO., Sole Wholesale Agents.

STEWART'S STERELIZED PASTE for mounting photographs, &c., and for general use. In bottles with brush, **6/-** and **12/-** per dozen.

MARION'S MOUNTING SOLUTION.—A very strong mountant, which will not cockle the thinnest mount. 6 ozs. **1/-**. Pts. **3/-**. Qts. **5/9**.

BRUCE'S NON-SHIFTING RETOUCHING MEDIUM.—The only Medium known which is positively unaffected by varnishing. **1/-** per bottle.

BRUCE'S MATT-SURFACE POWDER AND IVORY CLEANER for Retouchers, Colourists, Miniature Painters, &c. **1/-** per box.

MARION & CO., 22 & 23 Soho Square, London, W.

[See preceding and following pages.

Double Opaque Envelopes

MADE FROM

Pure Linen Air-dried Needle Paper.

The only paper made which is both opaque, and by reason of its chemical purity, safe to use in contact with the most sensitive films.

THESE envelopes, in addition to forming the very best possible means of securing plates, films, &c., from the action of light both before use and after exposure (in cases where the plates, &c., have to be kept some time before it is convenient to develop them) will be found again to be the best possible form of envelope in which to store the finished negatives, as any details or data may readily be written on the outer envelope by means of a white crayon pencil, or in white ink, or they may be labelled.

DOUBLE ENVELOPES.

For plates	Per doz.	For plates	Per doz.
3¼ × 3¼	3½d.	8½ × 6½	8d.
4¼ × 3¼	4d.	10 × 8	11d.
5 × 4	4½d.	12 × 10	1/2
6½ × 4¾	5½d.	15 × 12	1/5½
7½ × 5	7½d.		

Packed in packets of 2 dozen Double Envelopes.

Per gross :—3/- 3/4 3/9 4/9 6/4 7/- 9/6 12/- 15/-

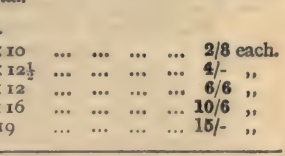
Plates packed in these Envelopes may be exposed to daylight for a considerable time without sustaining any damage.

Manufactured by Messrs. H. PARR & SONS, Ltd., Redditch.

MARION & CO., Sole Wholesale Agents.

ENAMELLED STEEL DISHES.

THESE dishes are of superior manufacture, and will be found to possess advantages over any others. They are light and strong, of a nice shape and depth, these points ensuring comfort to the user when developing. The enamel completely covers the steel and does not chip off, it is therefore impossible for the solutions to come into contact with the metal.



PRICES.

te	9d. each.	12 × 10	2/8 each.
5 × 4	1/- ,,	15½ × 12½	4/- ,,
½-plate	1/3 ,,	18 × 12	6/6 ,,
¼-plate	1/8 ,,	20 × 16	10/6 ,,
10 × 8	2/2 ,,	24 × 19	15/- ,,

MARION & CO., 22 & 23 Soho Square, W.

[*See preceding and following pages.*

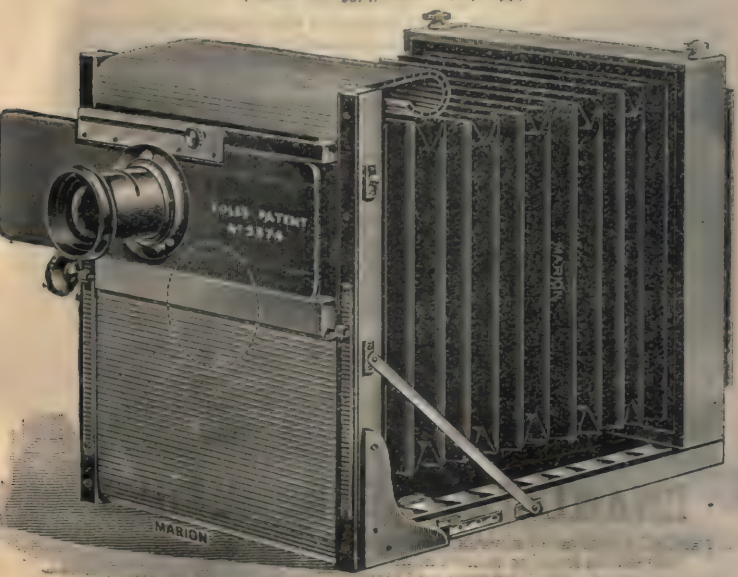
MARION & CO.

SQUARE BELLOWS FIELD CAMERAS

FITTED WITH

Coles' Patent Flexible Rising and Falling Front.

(Patent No. 5374, March 14th, 1894.)



THIS important IMPROVEMENT in Camera construction does away with all necessity of the swing back, swing front, in fact, swings of any kind. With this front the lens can be raised, or lowered, or moved horizontally so as to be opposite any portion of the plate as desired. The lens and sensitive film in this Camera are **always vertical and true** with each other, and **parallelism** is thus secured. **Distortion** is impossible Lenses do not need to be stopped down to correct the **errors** of tilting the Camera.

Invaluable to Architectural Photographers and others.

PRICES include 3 Double Backs.

	¼-plate.	½-plate.	¾-plate.	10×8.	12×10	15×12
1st Quality ...	£8 9 0	£11 2 0	£13 9 0	£17 4 0	£21 16 0	£27 0 0
2nd Quality ...	5 13 0	7 8 0	9 0 0	11 12 0	14 12 0	17 18 0

WRITE FOR FULL PARTICULARS. A LIBERAL DISCOUNT TO THE TRADE.

22 & 23 SOHO SQUARE, LONDON, W.

[*See preceding and following pages.*

MARION'S CAMERAS.

Thousands in use all over the World by Professional Photographers and others.

THE EXCELSIOR STUDIO CAMERA.

A strong, well-made Instrument at a reasonable price, including Repeating Single Dark Slide, extra Front and all Carriers, with Double Extension.

PRICE—	9½ in. square	£5 5 0
	12 ,, ,, ...	9 3 0
	15 ,, ,, ...	13 10 0

THE EMPIRE STUDIO CAMERA.

is of the very best quality and workmanship. Thoroughly seasoned wood throughout. Specially adapted for hot or damp climates.

PRICE—	8½ in. square	£8 5 0
	10 ,, ,, ...	9 15 0
	12 ,, ,, ...	11 15 0

THE PERFECTION FIELD CAMERA

'IMPROVED 1898 PATTERN.'

includes three Double Backs, Turntable Base, and Three-fold Ash Tripod. It has Double Extension, all movements, including Sliding Back, to allow of short focus lenses being used.

PRICES—	Half-plate	£8 5 0
	Whole-plate	9 15 0
	10 × 8	12 5 0
	12 × 10	14 10 0
	15 × 12	18 5 6

THE IMPROVED OXFORD CAMERA.

Excellent value and workmanship. All movements. A serviceable Camera at a low price.

Including 1 Double Back.	EXTRA BACKS.
Quarter-plate. Half-plate. Whole-plate.	Quarter-plate. Half-plate. Whole-plate.
£2 10 ... £3 10 ... £5	£0 12 ... £0 15 ... £1 1

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[*See preceding and following pages*

MARION'S HAND CAMERAS.

THE SWALLOW.

For the Amateur Photographer of every class in every country who wants a complete reliable instrument at a cheap rate.

For Plates 3¼×2¼ and 4¼×3¼.
Made in 5 styles.

THE MIGNON SWALLOW, carries 6 plates, 3¼×2¼ ... 8 -

THE SWALLOW, carries 12 plates, 3¼×2¼ ... ... 21 -

THE SUPERIOR SWALLOW Camera, carries 12 Plates 3¼×2¼ ... ... 26 -

THE SWALLOW ¼-plate, carries 12 plates 4¼×3¼... ... 30 -

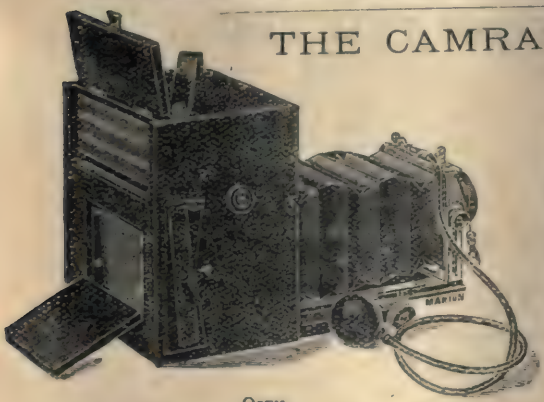
THE SUPERIOR SWALLOW ¼-plate, carries 12 plates 4¼×3¼ 35/-



COMPLETE PRINTING AND DEVELOPING SETS, for 3¼×2¼ Plates, 10 -
for Quarter-plates, 12 6

FULL INSTRUCTIONS for producing finished Pictures enclosed with each Camera.

THE CAMRANA, No. 2.



OPEN.



CLOSED.

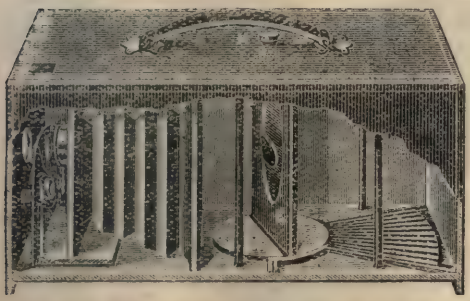
A First-class Folding Hand or Stand Camera, complete with 3 Double Backs, Time and Instantaneous Shutter, Focus Rack, Leather Bellows, Swing Back, and good R.R. Lens.

PRICE, **£6.** If fitted with Perfection R.R. Lens, **£7 10s.**
with Voigtlander's Special Hand Camera Lens, **£9.**

[*See preceding and following pages.*

MARION'S RADIAL HAND CAMERA,

Improved '1898' Pattern.



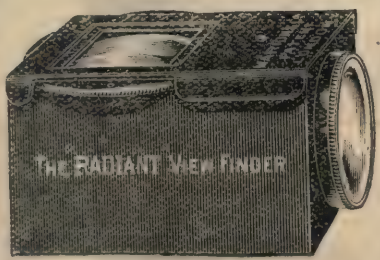
Is now made in a very much improved form—both the bulk & weight being greatly reduced. It is constructed to take 24 films in sheaths, or 12 Glass Plates *without* sheaths or backing. The **Shutter** is new and adapted for 'Time' or 'Instantaneous' exposures with a considerable range of speed adjustment, and this together with the lens is fitted on a rising and cross front. The **Finder** is also new—*one* of our Radiant mirrorless finders being arranged to serve for both vertical and horizontal pictures.

Prices vary according to quality of lens fitted:—

SIZE—	$3\frac{1}{4} \times 3\frac{1}{4}$ Lantern.	Quarter-plate.	5×4 or 9×12 ins.	Half-plate.
	£5 15s.	From **£7.**	From **£8.**	From **£12.**

MARION'S RADIANT VIEW FINDER.

'Undoubtedly the most brilliant Finder yet introduced.'



The Image is totally reflected.

It has no mirror or silvered surface to deteriorate and no ground-glass screen.

No. 1 is in box form, fitted with rotating plate for vertical and horizontal views. Screw fittings. Price **7s. 6d.**

No. 2 is for insertion in Hand Cameras, one Finder serving for both vertical and horizontal views. Price **7s. 6d.**

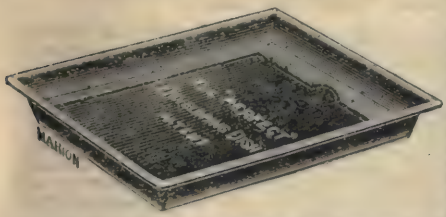
No. 3 is box form as No. 1. Groove fittings. Price **7s. 6d.**

No. 4 is box form, but larger, measuring $2\frac{1}{2} \times 1\frac{3}{4} + 1\frac{1}{2}$ ins. deep, showing a view $1\frac{3}{16} + \frac{15}{16}$ ins. Groove fittings. Price **15s.**

22 & 23 SOHO SQUARE, LONDON, W.

[*See preceding and following pages.*

Marion's Patent 'Perfect' Developing Dish.



THIS Dish is constructed with a well into which the plate fits exactly – the depth coinciding with the average thickness of plates in general use. Around the sides of the well is a narrow rabbet, the top of which is flush with the top, or film side, of the plate. At one end of the rabbet is a semi-circular depression to facilitate the easy removal of the developed plate. This arrangement prevents the formation of air bubbles, economises the developer, as the plate *is* the bottom of the dish, and promotes evenness of development.

Prices: Quarter-plate, **8/-**. 5 + 4, **10/-**. Half-plate, **12/-**. Whole-plate, **16/-** per dozen.

'A GREAT SUCCESS.'

Salmon's New Adjustable Vignetter.



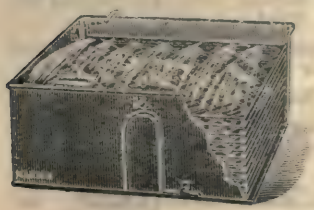
Can be used with any ordinary Printing-frame and in no way interferes with its use when Vignettes are not required. It can be immediately attached or detached and remains secure in any position. It allows of adjustment up and down or sideways, and by means of metallic groves the Vignetting card can be placed nearer or farther from the negative, or at an angle; or immediately changed for another card of different size opening.

Such a Vignetter has long been wanted, especially by the Professional Photographer.

Prices: Including Aluminium Slides and 12 Vignetting Cards (6 with opening of different sizes, and 6 for cutting as desired)

Quarter-plate, **2/-** each. Half-plate, **2/6** each. Whole-plate, **3/6** each.

Marion's Improved Sectional Print Washer.



The only safe Washer for Gelatine Prints. No tearing or damaging of the surface. Perfect elimination of Hypo.

No. **1**, with 12 trays, size 25 × 19, **42/**
„ **2**, „ „ „ 13 × 11, **19/**
„ **3**, „ „ „ 9 × 9, **15/-**

[*See preceding and following pages.*

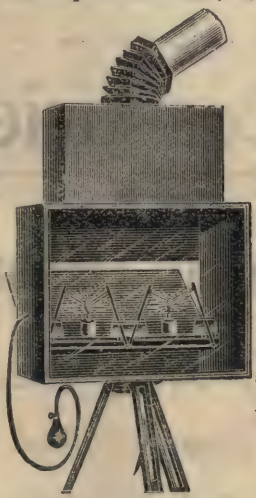
SALMON'S NEW PORTABLE

Magnesium Ribbon Lamp

PATENT APPLIED FOR.

PORTABILITY. UTILITY. SIMPLICITY.

For Portraiture or Groups in Studio, Room, or Out doors.



For COPYING or ENLARGING WITHOUT CONDENSERS.

A Powerful well-diffused Light of 5 to 8 seconds duration.

NO DANGER — NO EXPLOSIVE COMPOUND USED.

INDEPENDENT OF ANY OTHER LIGHT SUPPLY.

NO STARTLING EFFECTS.

NOT A FLASH LIGHT —LONG OR SHORT EXPOSURES.

ENTIRELY FREE FROM NOISE, SMOKE or SMELL, products of combustion being carried away through an ingeniously light and portable telescopic chimney, extending to 8 feet (any length extension may be added).

Inclined in ANY DESIRED direction, to nearest available outlet, enabling A NUMBER of exposures to be made in quick succession.

THE APPARATUS consists of specially constructed Brass Spirit Lamps, and a series of arms at the end of each of which two or more charges of Magnesium Ribbon are clipped (held together by a metal sheath), which can be **fired simultaneously or consecutively,** actuated pneumatically by a Rubber Tube and Ball, bringing the Magnesium Ribbon into contact with the flame of the Spirit Lamps. The whole is contained in a portable polished Mahogany Cabinet, 25 × 20 × 9 inches, with door at back for charging and re-charging; sliding panel front and corrugated glass light diffuser, also in sliding frame; forming a compact, well-made and elegant adjunct to the studio, and so constructed for portability that it can be set up where desired in less than five minutes, being entirely self contained.

Price £10 10s.

TELESCOPIC CHIMNEY PACKS WITH TRIPOD STAND.

[*See preceding and following pages.*

MARION & CO.'S
Studio Furniture

— AND —

Accessories.

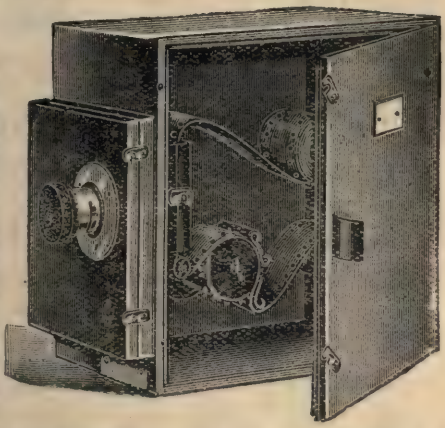
TO PROFESSIONAL PHOTOGRAPHERS.

BEFORE *buying fresh goods for the Season* '1898,' *send for our new list of Artistic Furniture and Accessories* (*a very choice selection*), *or call at our warehouse and see the goods. It will be worth your while.*

22 & 23 SOHO SQUARE, LONDON, W.

[*See preceding and following pages.*

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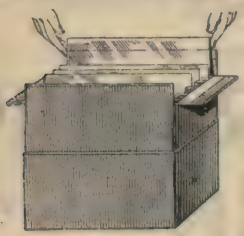
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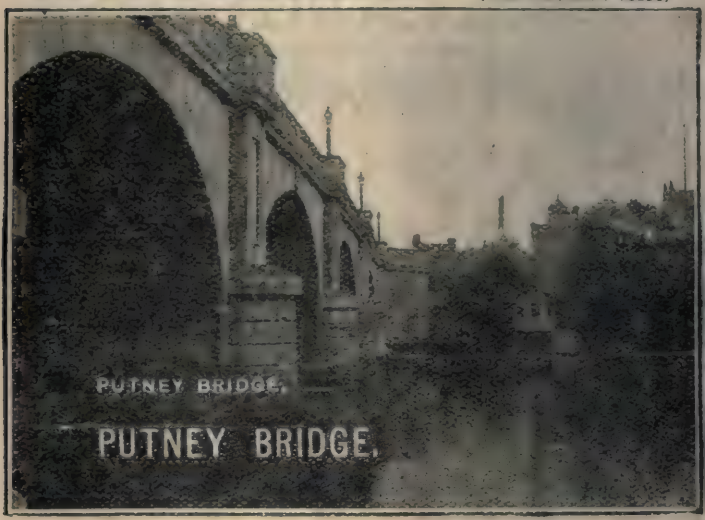
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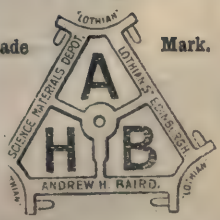
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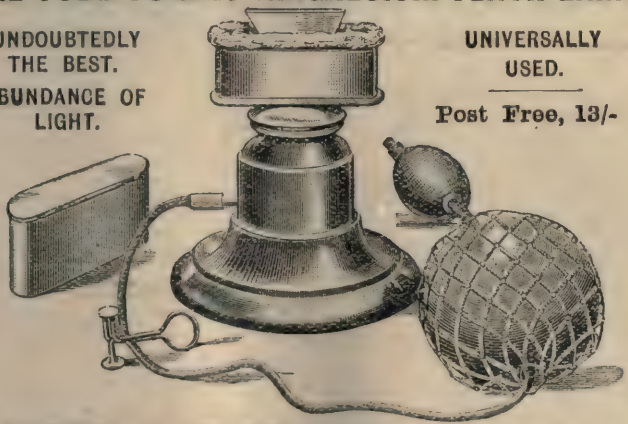
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On page 39 a few remarks will be found on the individual merits of the different lenses of this series with respect to various modes of application.

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A Rapid Special Lens for Instantaneous Photographs, Portraits and Groups, also for Copying, Enlarging and Demonstrations on the Screen.

Manufactured by ROSS, LIMITED.

Sole Licensees for the British Empire.

Series and No.	Equivalent Focus.		Relative Aperture.	Size of Plate Covered. At full Aperture.	Size of Plate Covered. With intermediate stops.	Angle.	In Brass Mount with Iris-Diaphragm. £	s.	d.
	mm.	in.	F.	in.	in.	Degrees			
I^a, 1	20	¾	4·5	⅓ × ½	¾ × ¾	65	6	0	0
I^a, 2	35	1⅜	4·5	⅜ × ⅜	1¼ × 1¼	65	6	0	0
I^a, 3	50	2	4·5	1¼ × 1¼	1¾ × 1¾	65	6	0	0
I^a, 4	75	3	4·5	1⅝ × 1⅝	2⅜ × 2⅜	65	6	0	0
I^a, 5	100	4	4·5	2⅜ × 2⅜	3½ × 3½	65	6	0	0
I^a, 6	40	1⅝	3.6	1 × 1	1⅝ × 1½	70	5	0	0
I^a, 7	60	2⅜	3.6	1⅝ × 1⅝	2½ × 2⅜	70	5	0	0
I^a, 8	83	3¼	3.6	2 × 2	3¼ × 2½	70	6	0	0
I^a, 9	110	4½	3 6	3¼ × 2½.	4¼ × 3¼	70	7	10	0
I^a, 10	130	5	3.8	3¼ × 3¼	5 × 4	70	9	0	0
I^a, 11	160	6¼	3.8	4¼ × 3¼	6½ × 4¾	70	11	0	0
I^a, 12	205	8	4.0	6½ × 4¾	7½ × 5	65	15	10	0
I^a, 13	250	10	4.0	7½ × 5	9 × 7	65	21	10	0
I^a, 14	300	12	4.2	8½ × 6½	10 × 8	62	27	10	0
I^a, 15	370	14½	4·5	9 × 7	16 × 12	72	34	10	0
I^a, 16	423	16¾	4·5	10 × 8	18 × 14	72	43	0	0
I^a, 17	470	18½	5.0	12 × 9½	20 × 16	68	50	0	0
I^a, 18	610	24	5.0	16 × 12	24 × 20	68	100	0	0
I^a, 19	840	33	6.0	20 × 16	32 × 26	64	175	0	0

When working with the Planar it should be remembered that, owing to the great rapidity of the lens, one is apt to over-expose. This naturally causes fogging, and hence it is often advisable to make use of a restrainer during the process of developing.

The halves of the Planar (front and back lenses) cannot be used as landscape lenses excepting with very small stops.

The cost of pairing two Lenses for Stereoscopic work is 8*s*.

THE ABOVE PRICES ARE NET.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

Special Applications of the

New Planar Lenses.

Instantaneous Photography, Nos. 6 to 19 of Series I[a] are adapted for photographing objects in motion. The size of plate covered at full aperture as given in the Table determines the most suitable focus in each case. For exposures of this kind, which should naturally be as short as possible, it is best to use a focal plane shutter placed immediately in front of the plates.

Instantaneous street scenes and *genre* pictures may be taken with intermediate stops, the covering powers being those given in the Table under the respective heading. The Lens requires in these cases a stop of *f*/6 to *f*/9 according to its focal length and the required depth of focus

Portraits and Groups. Nos. 12 and 19 are adapted for this class of work, No. 12 being suitable for portrait Carte-de-Visite, No. 19 for heads in ½ size, No. 12 for groups measuring 7½ × 5 inches, No. 19 for groups measuring 18 × 24 inches. Portraits should be taken with stops of *f*/4.5 to *f*/6. Groups require stops of *f*/6 to *f*/12.5 according to the number of rows or the requisite depth of focus.

Kinematograph pictures. Animated pictures are conveniently made with Nos. 1 to 4 and Nos. 6 and 7. The final selection depends upon the size of the film and can generally be made from the plate sizes given in the first column.

Photo-micrographic Enlargements and Reductions: Nos. 1 to 5 fitted with the English Microscopic Society Screw are well adapted for Photo-micrographic Enlargements. They yield magnifications up to 100 diameters and embrace an angle of about 30°. Even Nos. 6 to 8 are available for these purposes. Nos. 1 to 8 are equally well adapted for the production of microscopic reductions, such as are used in communications by carrier pigeons.

Process Work (Autotype, Three Colour Printing, Half-tone and Photogravure). Nos 15 to 19 are available for these purposes, No. 15 covering a plate 12 × 10, No 19, 32 × 26 inches. When working with these lenses the following rules should be observed: Object, objective and focussing screen should be well adjusted with respect to each other, it being absolutely necessary that the object and focussing screen should be strictly parallel to each other, and the axis of the objective should be accurately at right angles to the focussing screen. Any imperfections in these adjustments are rendered apparent, in the shape of dissymmetrical definition, more readily than with the lenses hitherto used for copying. This is due to the fact that the Planars work at considerably larger apertures than the latter, in which inaccuracies are to a certain extent covered by their greater depth of focus.

Focussing must be done with the most scrupulous care. When copying engravings it is advisable to follow the old plan of determining the best position of the screen by a series of trials.—Half-tones are copied with a stop of *f*/9 to *f*/6, engravings with stops of *f*/10 to *f*/18,

Sole Manufacturing Licensees for the British Empire.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
MANUFACTORY—CLAPHAM COMMON.

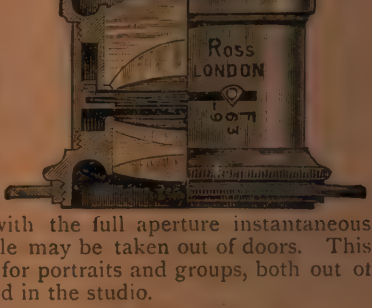
SERIES II.

ZEISS' ANASTIGMAT, F:6.3.

MANUFACTURED BY ROSS, LIMITED.

Sole Licensees for the British Empire.

EXTRA RAPID.
(Doublet of 5 Lenses.)



Highly recommended for

GENERAL OUTDOOR WORK
And the Studio.

THE field, embracing an angle of about 85 degrees, is very well compensated for Astigmatism, so that even with the full aperture instantaneous pictures covering a wide angle may be taken out of doors. This series is highly recommended for portraits and groups, both out of doors and in the studio.

RATIO OF STOPS.—*f*/6.3, *f*/9, *f*/12, *f*/18, *f*/25, *f*/36, *f*/50, *f*/71.

REVISED PRICES.

No.	Equiv. focus m/m	Equiv. focus Inches.	Largest effective diam. of Lens. Inches.	Size of Plate covered at *f*/9. Inches.	Brass Mounts with Iris Diaphragms.	Alumin. Mounts with Iris Diaphragms.
1	85	3⅜	⅝	2½ × 3¼	£4 5 0	£4 15 0
2	105	4⅛	¾	3¼ × 4	4 15 0	5 5 0
3	140	5½	1	3¼ × 4¾	5 15 0	6 5 0
4	170	6¾	1¼	4¾ × 6	7 5 0	7 15 0
5	210	8¼	1½	5¼ × 7½	9 5 0	9 15 0
6	250	10	1⅝	5½ × 8½	11 5 0	12 0 0
7	300	12	2	6½ × 8½	15 10 0	16 5 0
8	360	14¼	2½	7½ × 9½	21 10 0	22 10 0
9	430	17	2¾	8½ × 10½	27 10 0	28 10 0
10	510	20¼	3⅜	9½ × 12	34 10 0	35 15 0
11	590	23⅜	3¾	10⅓ × 14	43 0 0	44 5 0

These Lenses are kept in stock with Iris Diaphragms only. If Waterhouse Stops are required, they can be supplied at same price as for Iris.

Cost of pairing two lenses for stereoscopic work, 8/-.

The above prices are net.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

SERIES IIa.

ZEISS' ANASTIGMAT, F:8

A New Extra Rapid Wide-angle Portrait, Group, and General Lens.



MANUFACTURED BY

ROSS, Ltd.,

Sole Licensees for the British Empire.

RATIO OF STOPS:

F/8, *F*/11·3, *F*/16, *F*/22·6, *F*/32, *F*/45, *F*/64,

THIS is a very fine New Series, giving exquisite definition with full aperture, and including, with the smaller stops, an angle of about 75°. It is admirably adapted for work requiring perfect definition with rapid exposures, and is unrivalled for all classes of photography, including copying and enlarging.

The three smallest sizes make splendid hand camera lenses.

No.	Equivalent Focus. mm.	Equivalent Focus. in.	Plate covered *f*/8. in.	Plate covered *f*/16. in.	Plate covered *f*/32. in.	Prices in Brass Mounts. £ s. d.	Prices in Aluminium Mounts. £ s. d.
1	110	4¼	3¼ × 3¼	4¼ × 3¼	5 × 4	4 5 0	4 15 0
½	136	5¼	4¼ × 3¼	5 × 4	6½ × 4¾	4 15 0	5 5 0
3	167	6½	5 × 4	6½ × 4¾	8½ × 6½	6 5 0	6 15 0
4	205	8	6½ × 4¾	8½ × 6½	9 × 7	7 15 0	8 5 0
5	244	9½	8½ × 6½	9 × 7	10 × ▮	9 5 0	9 15 0
6	295	11⅝	9 × 7	10 × 8	12 × 10	12 5 0	13 0 0
7	350	13¾	10 × 8	12 × 10	13 × 11	18 0 0	18 15 0
8	433	17	12 × 10	13 × 11	15 × 12	23 0 0	24 0 0

The cost of pairing two Lenses for Stereoscopic work is 8*s*.

THE ABOVE PRICES ARE NET.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

SERIES IIIa.

ZEISS' ANASTIGMAT, F:8



Series IIIa.

MANUFACTURED BY

ROSS, Limited,

Sole Licensees for the British Empire.

A High-Class Rapid Wide-Angle Lens for General Outdoor Work.

THESE Lenses are perfectly compensated for Astigmatism, and embrace, with the smaller stops, an angle of about 97 degrees. The smaller sizes are specially suitable for Hand Cameras. They are the finest Rapid Anastigmatic Lenses ever quoted at such low prices.

RATIO OF STOPS ...	F 8	F 11·3	F 16	F 22·6	F 32	F 45	F 64

REVISED PRICES.

No.	Equiv. focus m/m	Equiv. focus. Inches.	Size of Plate covered at *f*-11·3. Inches.	Plate covered at *f*-22.	Brass Mounts with Iris Diaphragms.	Alumin. Mounts with Iris Diaphragms.
1	120	4¾	4¼ × 3¼	5 × 4	£3 5 0	£3 15 0
2	150	6	5 × 4	6½ × 4¾	3 15 0	4 5 0
3	172	6¾	6½ × 4¾	8 × 5	4 10 0	5 0 0
4	196	7¾	8 × 5	8½ × 6½	5 0 0	5 10 0
5	230	9¼	8½ × 6½	9 × 7	6 10 0	7 0 0
6	272	10¾	9 × 7	10 × 8	8 0 0	8 10 0
7	317	12½	10 × 8	12 × 10	10 0 0	10 15 0
8	407	16¼	12 × 10	13 × 11	15 0 0	15 15 0
9	505	20¼	13 × 11	15 × 12	20 0 0	21 0 0
10	600	24	15 × 12	18 × 16	25 0 0	26 0 0
11	690	27½	18 × 16	22 × 18	32 10 0	33 15 0
12	820	32¼	22 × 18	25 × 22	40 0 0	41 5 0

These Lenses are kept in stock with Iris Diaphragms only. If Waterhouse Diaphragms are required, the lenses will have to be specially made, and the prices will be the same as for Iris.

The cost of pairing two Lenses for stereoscopic work is 8/-.

THE ABOVE PRICES ARE NET.

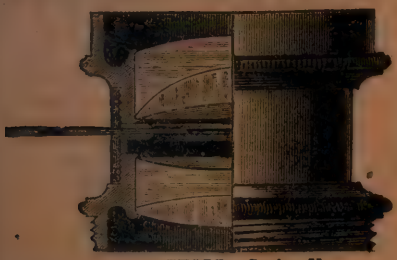
ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

SERIES V.

ZEISS' ANASTIGMAT, F:16



ZEISS. Series V.

WIDE ANGLE & COPYING LENS.

MANUFACTURED BY

ROSS, Limited,

Sole Licensees for the British Empire.

RATIO OF STOPS.
F/16, F/22, F/32, F/45, F/64.

THIS Doublet consists of four single lenses cemented to form two combinations. The field measures with the smaller numbers about 108°, with the larger ones about 90°. The first seven sizes are specially useful for interiors or work in confined situations. The five larger sizes are specially intended for the reproduction of maps, plans, and drawings, they yield a perfectly flat and anastigmatic image, and are entirely free from distortion.

No.	Equivalent focus. mm.	Equivalent focus. in.	Size of plate covered with stop *f*/32. cm.	Size of plate covered with stop *f*/32. in.	Revised Price with Iris Diaphragms	Price in Aluminium with Iris Diaphragms.
1	86	3½	12×15	5 × 4	£3 4 0	£3 14 0
2	112	4½	13×18	6½ × 4¾	3 4 0	3 14 0
3	141	5½	16×21	8½ × 6½	4 0 0	4 10 0
4	182	7½	20×26	10 × 8	5 0 0	5 10 0
5	212	8½	24×30	12 × 10	6 5 0	6 15 0
6	265	10½	26×35	13 × 11	7 15 0	8 5 0
7	315	12½	30×40	15 × 12	9 5 0	9 15 0
			Reproductions ot charts at 85°.			
8	460	18	30×40	15 × 12	12 5 0	12 15 0
9	632	24¾	40×50	20 × 16	18 0 0	18 10 0
10	947	37¼	50×65	25 × 20	35 10 0	36 10 0
11	1310	51½	70×86	34 × 27	60 10 0	61 15 0
12	1660	65½	90×110	43 × 35	100 10 0	102 0 0

The cost of pairing two lenses for stereos is 8/-.
The four smallest sizes cannot be fitted with Iris Diaphragms and are kept in stock with Wheel Stops only. All other sizes are stocked with Iris only.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

Series VII. F:12.

CONVERTIBLE SINGL

(ZEIS

Manufactured by ROSS, Limited, Sole Ma

Admirably adapted for Portraits, Groups, Landscapes, and e either singly or combined as in Series VIIa. They

The 'relative rapidity' of this Anastigmatic Lens is *f*/12.5, and the in any Single Landscape Lens hitherto produced, while the marginal dist fore, suitable for instantaneous outdoor pictures such as landscapes and seas

English ratio of Stops : *f*



No.	Equivalent Focus.		Plate covere	
			*/12.5	
	mm.	ins.	c/m.	inch
0	100	4	6 × 9	3½
00	135	5⅜	7 × 10	4
000	170	6¾	9 × 12	4¾
1	183	7¼	12 × 15	6½
2	224	9	13 × 18	7½
3	285	11½	16 × 21	8½
4	350	14	21 × 27	10
5	412	16½	24 × 30	12
6	480	19¼	29 × 34	13
7	590	23¼	30 × 40	15
8	690	27½	34 × 39	15
9	815	32	39 × 47	18
10	920	36¾	40 × 50	20
11	1050	42	47 × 57	22

SERIES VIIa. *f*/6.3 (see next page).—These Lenses are composed similar components is like other symmetrical lenses free from distortion. provided to screw in the front of the mount in place of the combination re the stops being marked off both for the doublets and the single combinatio lenses; in all thirty doublets are formed from the combination of the eleve be supplied with one or two more single lenses to combine in the manne the divisions showing apertures of the stops for the resulting foci. This on it and the setting indicates four or seven series of apertures, as the c lenses of different foci with 2/6 extra for each additional single lens. T accordance with the form generally accepted in England, each aperture

The above Pric

ROSS, Limited, Opticians, 111 N

Works: CLA

New Series of

ANASTIGMATIC LENSES.

(PATENT.)

ufacturing Licensees for the British Empire.

ness of Photography in the Studio or out of doors, when used approached by any other Single Lens in existence.

ubraced is over 85°. The Anastigmatic flatness of the image is unapproachable en used on a moderate angle is practically inappreciable. The Lens is, there- t also for large portraits and groups in a bright light.

6, *f*/22.6, *f*/32, *f*/45, *f*/64.

PRICES IN LONDON, WITH IRIS DIAPHRAGM.			Code Word.	No.
£	s.	d.	Dollars.	
4	10	0	22	Abdera	0
4	10	0	22	Absynth	00
4	10	0	22	Abydos	000
3	15	0	18	Acacia	1
4	5	0	21	Acarina	2
5	0	0	25	Aceton	3
6	0	0	30	Achilles	4
7	15	0	38	Acidalia	5
10	15	0	54	Aconitum	6
13	15	0	66	Adinol	7
18	0	0	90	Aeneas	8
23	0	0	112	Aeolus	9
29	0	0	141	Aequator	10
37	10	0	185	Aether	11



ubinations of the Series VII. The Anastigmatic Doublet made up of two hese components may be used singly as in the Series VII.; a screen ring being s to intercept reflected light. The settings are furnished with Iris diaphragms, ety of other foci (*f*/8) are available by combining suitable dissimilar single es of the Series VII. Any one possessed of a doublet (*f*/6.3) can therefore rlcaf. An alteration to the setting is necessary for this conversion to provide consists of the adaptation of a movable ring so constructed that the engraving ire. The price charged for this adaptation and engraving is 7/6 two single all the lenses we manufacture are for greater convenience marked off in ble the exposure of the next larger.

Net Prompt Cash.

OND STREET, LONDON, W.

MMON, S.W.

Series VIIa. CONVERTIBL

Manufactured by ROSS, Limited, Sole

A Universal Series of Lenses specially suitable for Portraits and Groups

These Lenses are formed by combining suitable single

NO.	Combination of Two Lenses. f/12·5.				Resulting Combined Focus.		Largest Aperture.	A
	Front Lens.		Back Lens.					Full Ap
	mm.	ins.	mm.	ins.	mm.	ins.	f	Inch
0	100	4	100	4	61	2 7/16	6·3	1½ ×
00	135	5 3/8	135	5 3/8	82	3 1/4	6·3	2 ×
000	170	6 3/4	170	6 3/4	102	4	6·3	2 3/8 ×
1	183	7¼	183	7¼	105	4 1/8	6·3	3¼ ×
2	224	9	183	7¼	115	4½	7	4¼ ×
3	285	11⅛	183	7¼	127	5	8	5 ×
4	224	9	224	9	128	5	6·3	5 ×
5	285	11⅛	224	9	143	5 5/8	7	6 ×
6	350	14	224	9	156	6¼	8	6 ×
7	285	11⅛	285	11⅛	163	6½	6·3	6½ ×
8	350	14	285	11⅛	179	7	7	7½ ×
9	412	16⅛	285	11⅛	192	7½	8	8 ×
10	350	14	350	14	200	8	6·3	8 ×
11	412	16⅛	350	14	216	8½	7	8½ ×
12	480	19¼	350	14	232	9⅛	8	8½ ×
13	412	16⅛	412	16⅛	235	9¼	6·3	8¼ ×
14	480	19¼	412	16½	254	10	7	9 ×
15	590	23⅛	412	16⅛	277	11	8	9 ×
16	480	19¼	480	19¼	275	11	6·3	9 ×
17	590	23⅛	480	19¼	303	12	7	10 ×
18	690	27⅛	480	19¼	324	12¾	8	10 ×
19	590	23⅛	590	23⅛	337	13¼	6·3	10 ×
20	690	27⅛	590	23⅛	364	14⅜	7	12 ×
21	815	32	590	23⅛	391	15⅜	8	12 ×
22	690	27⅛	690	27⅛	395	15⅝	6·3	12 ×
23	815	32	690	27⅛	427	17	7	13 ×
24	920	36¾	690	27⅛	451	18	8	13 ×
25	815	32	815	32	465	18⅜	6·3	13 ×
26	920	36¾	815	32	494	19½	7	15 ×
27	1050	41	815	32	524	20¾	8	15 ×
28	920	36¾	920	36¾	526	20¾	6·3	15 ×
29	1050	42	920	36¾	561	22	7	18 ×
30	1050	42	1050	42	600	23⅝	6·3	18 ×

The above Prices are for Net Prompt Ca

NASTIGMATS, F:6.3 (Zeiss Patent.)

cturing Licensees for the British Empire.

llio, and for all classes of Outdoor Photography, also for Interiors, Copying, &c

eries VII. (*f*/12·5), as described on the preceding pages.

PLATES COVERED.		PRICES IN LONDON. In Brass Settings, with Iris.			Cable Code Word.	NO.
At *f*/11·3. Inches.	At *f*/22·6. Inches.	£	s.	d.		
2 × 1⅝	2½ × 2	8	15	0	Accord	0
2½ × 2¼	3 × 2½	8	15	0	Agathe	00
3¼ × 2½	4 × 3	8	15	0	Agnes	000
5 × 4	5 × 4	7	5	0	Agonie	1
6 × 5	6 × 5	7	15	0	Alabaster	2
6½ × 4¾	6½ × 4¾	8	10	0	Alauda	3
7½ × 5	7½ × 5	8	5	0	Albatros	4
8 × 5	8 × 5	9	0	0	Alizarin	5
8 × 5	8⅓ × 6½	10	0	0	Alkaloid	6
8½ × 6½	8½ × 6½	9	15	0	Alkohol	7
8½ × 6½	9 × 7	10	15	0	Amidon	8
9 × 7	9 × 7	12	10	0	Ananas	9
9 × 7	10 × 8	11	15	0	Anchovis	10
10 × 8	10 × 8	13	10	0	Anilin	11
10 × 8	12 × 10	16	10	0	Anthracit	12
10 × 8	12 × 10	15	5	0	Antimon	13
12 × 10	12 × 10	18	5	0	Antipyria	14
12 × 10	12 × 10	21	5	0	Apostat	15
12 × 10	12 × 10	21	0	0	Aristos	16
12 × 10	13 × 11	24	0	0	Asbest	17
13 × 11	13 × 11	28	5	0	Athene	18
13 × 11	13 × 11	27	0	0	Atlas	19
13 × 11	15 × 12	31	5	0	Atropin	20
13 × 11	15 × 12	36	5	0	Aurantia	21
13 × 11	15 × 12	35	10	0	Aurora	22
15 × 12	18 × 16	40	10	0	Autonom	23
15 × 12	18 × 16	46	10	0	Autoclave	24
15 × 12	22 × 18	45	10	0	Autor	25
15 × 12	24 × 20	51	10	0	Avicula	26
18 × 16	24 × 20	60	0	0	Azobenzol	27
18 × 16	24 × 20	57	10	0	Azoflavin	28
22 × 18	25 × 22	66	0	0	Azorubin	29
22 × 18	28 × 24	74	10	0	Azurin	30

s of Convertible Anastigmats see next Page.

Sets of Convertible Anastigmats.

Composed of Anastigmatic Lenses, F/12.5, Series VII. (Zeiss' Patent.)



SETS of lenses affording a considerable variety of Rapid combinations of various focal lengths can be readily selected from Table VIIA. These sets, consisting of few component Rapid and Anastigmatic lenses, provide a series working at 1 : 6.3, 1 : 8 and 1 : 12.5 of very high efficiency for all photographic purposes.

Of these sets of Anastigmats we propose for the present season to keep in stock those suitable for half-plate and whole-plate, and any of the other combinations we can only undertake to supply in a reasonable time after receiving definite order.

Each of the Stock Sets consist of—

1. A special setting fitted with Iris diaphragm so arranged that either of the combinations may be screwed into back or front as desired.

2. Three or four single Anastigmats *f*/12.5, each cell being engraved with the focal length.

3. A 'screen ring' to intercept any reflected light when a single lens only is in use.

4. A portable case to contain lenses and setting.

When these lenses are used as Single Anastigmats they must be inserted into the back of the setting and the 'screen ring' screwed into the front. When two lenses are to be used in combination the 'screen ring' is replaced by the second lens, or in the case of two different focal lengths, by the longer of the two, as in this way the largest possible relative opening of the doublet is obtained.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET.)

MANUFACTORY—CLAPHAM COMMON.

SET C.

For Plates 6½ × 4¼ or 7½ × 5 inches.

Consisting of Single Lenses Nos. 2, 3, and 4, Series VII., with setting and screen ring complete in Leather Case.

No.	Front Lens. Inches.	Back Lens. Inches.	Combined Focus. Inches.	Largest Aperture. *f.*	Plate Covered. Inches.	Price £14 15s., with 10/- extra for additional Ring and Scales of Apertures.*	Code Word, Alpha.
1		9	9	12 5	7½ × 5		
2		11½	11½	12.5	8½ × 6½		
3		14	14	12.5	10 × 8		
4	11½	9	5¾	7	6 × 5		
5	14	9	6½	8	6½ × 4¼		
6	14	11½	7	7	7½ × 5		

PRICES ARE STRICTLY NET.

SET D.

For Plates 8¼ × 6½ or 9 × 7 inches.

Consisting of Single Lenses Nos. 3, 4, 5, and 6, Series VII., with setting and screen ring complete, in Leather Case.

No.	Front Lens. Inches.	Back Lens. Inches.	Combined Focus. Inches.	Largest Aperture. *f.*	Plate Covered. Inches.	Price £28 15s., with 15/- extra for additional Ring and Scales of Apertures.*	Code Word, Alphabet.
1		11½	11½	12.5	8½ × 6½		
2		14	14	12.5	10 × 8		
3		16½	16½	12.5	12 × 10		
4		19¼	19¼	12.5	13 × 11		
5	14	11½	7	7	7½ × 5		
6	16½	11½	7½	8	8 × 5		
7	16½	14	8½	7	8½ × 6½		
8	19¼	14	9¼	8	8½ × 6½		
9	19¼	16½	10	7	9 × 7		

PRICES ARE STRICTLY NET.

* To make intricate calculations unnecessary, and to simplify the fixing of the different apertures when several combinations of Series VII. are used in the same setting, we have adopted a special arrangement by which a revolving click ring is supplied with each setting. The lenses of Series VII*a.* when supplied with similar ends, each *f*/6.3, will not require this ring, and will only be engraved for the stops of the complete combination; the extra ring not being required in this case there will be no extra charge. If one such doublet has a dissimilar combination added afterwards, the setting (which is so made to allow of this) will require to have this ring added with the necessary scale of stops for the additional single lens, and for those of the combination it forms with one or other of the original combinations. For this additional ring and scale a charge of 7/6 will be made. Should two additional single lenses be ordered, the extra charge for the ring and scales will be 10/-. A set of three dissimilar ends ordered at the same time will, therefore, be subject to an extra charge of 10/- on the original Zeiss prices, as a ring and six sets of engraving would have to be supplied.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

ZEISS' TELE-OBJECTIVES.

Patented in Germany, United States, England, &c.

Tube-mount.

No.	PRICE.	Code-word.
	£ s. d.	
III.	4 0 0	Ration.
IV.	7 10 0	Ratte.

Tele-Positive 1:3.*

No.	Diameter of lenses mm.	Focus mm.	PRICE.	Code-word.
			£ s. d.	
1	45	135	6 0 0	Raffinade
2	75	225	20 0 0	Raphael
3	125	375	50 0 0	Reaction

Tele-Negative 1:2.

No.	Diameter of lenses mm.	Focus mm.	PRICE.	Code-word.
			£ s. d.	
1	15	27	2 0 0	Realitas
2	24	45	2 10 0	Record
3	30	58	3 10 0	Regulus
4	37	75	5 0 0	Remedium
5	50	100	7 10 0	Reptilia
6	63	125	11 0 0	Relais

* The Tele-Positives must not be imported into France commercially.

ROSS, LIMITED, Manufacturing Opticians,

The Tele-Positives must not be imported into France commercially

A. SPECIFICATION

of Tele-photographic Combinations adapted for Mount-tube III.

B. SPECIFICATION

of Tele-photographic Combinations adapted for Tube-mount IV.

No.	Positive Element.	Focus mm.	Neg. Elem. Focus mm.	PRICE. £ s. d.	Code-word.	For	Positive Element.	Focus mm.	Neg. Elem. Focus mm.	PRICE. £ s. d.	Code-word.	No.
1*	Tele-Pos. 1 : 3	135	45	12 10 0	Resonator	Landscapes and large Portraits	Tele-Pos. 1 : 3	225	75	32 10 0	Rubin	1*
2*	Tele-Pos. 1 : 3	135	58	13 10 0	Retina		Tele-Pos. 1 : 3	225	100	35 0 0	Rubrik	2*
3	Anast. 1 : 7.2	195	58	13 15 0	Ricinus	Landscapes and Architectural Views.	Anast. 1 : 7.2	315	100	27 10 0	Ruder	3
4	Anast. 1 : 7.2	195	75	15 5 0	Rodinal		Anast. 1 : 7.2	442	125	38 0 0	Ruf	4
5	Anast. 1 : 8	205	58	15 10 0	Rosmarin		Anast. 1 : 8	350	100	33 10 0	Rumor	5
6*	Satz-Anast. 1 : 7	179	58	18 10 0	Rotator		Anast. 1 :	433	125	42 0 0	Rundung	6*
7*	Satz-Anast. 1:6.3	200	75	21 0 0	Rubens		Satz-Anast. 1:6.3	337	100	42 10 0	Russe	7*
8*	Satz-Anast. 1 : 7	216	75	22 15 0	Ruptura		Satz-Anast. 1 : 7	364	125	50 5 0	Ruthene	8*

The Combinations marked with a * must not be imported into France commercially.

REVERSING PRISMS & MIRRORS

For Photo-Mechanical Process Work, &c.

THESE Prisms are made of carefully annealed and colourless crown glass; they are accurately rectangular, and their hypothenuse surface is silvered to ensure complete reflection.

The mount of the prism screws directly to the hood of the objective in such a manner as to bring one of the non-reflecting surfaces into close proximity of the front lens. By this arrangement the prism becomes fully utilised.

The prices of the prisms include an objective-ring fitted with revolving collar and clamp, which allows of the objective being turned about its axis and clamped in any position which the prism is desired to occupy.



PRICES OF PRISMS.

No.	Length and breadth of Non-reflecting Surfaces.		Price.		
	Ins.	mm.	£	s.	d.
1	1	25	4	0	0
2	1 3/8	35	5	10	0
3	1 7/8	46	7	10	0
4	2 3/8	60	12	10	0
5	3	75	19	0	0
6	3 1/4	90	27	10	0
7	4 1/8	105	40	0	0
8	4 7/8	125	70	0	0

The above Prices are Net.

Prices of Mirrors, Worked Optically Plane & Silvered,

Including Mahogany Mirror Box.

Size.	6 × 4	7 × 5	8 × 6	10 × 8
Series A ...	£4 10 0	£5 0 0	£6 0 0	£7 10 0
,, B ...	3 0 0	3 10 0	4 0 0	5 0 0
Re-silvering ...	0 5 0	0 7 6	0 10 0	0 12 6

THE ABOVE PRICES ARE NET.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(Corner of Brook Street).

MANUFACTORY—CLAPHAM COMMON.

Ross' PATENT CONCENTRIC LENSES



The most perfect Lenses for Landscapes, Architecture, Copying, &c.

Ratio of Stops:
*f/16, f/22, f/27, f/32, f/38, f/45.

THE Concentric Lenses are the most perfect ever introduced, being absolutely free from distortion, astigmatism, flare, and other imperfections incidental to all lenses of ordinary construction.

The Concentric Lenses give uniformly perfect definition with equal illumination over an absolutely flat field of a circle of about 75°, the extreme oblique rays coming to focus with the same remarkable sharpness as the central pencils; and, therefore, these lenses will cover a larger plate when desired than those specified.

The Concentric defines perfectly with its full aperture, and does not require the use of stops to obtain marginal definition as in other lenses; the stops, therefore, need only be used to regulate the time of exposure and the depth of focus.

* For landscape purposes, where uniformly soft and artistic effects over the entire field, not necessitating critically sharp definition, are required, these lenses are frequently used by eminent photographers at the aperture of *f*/16, with which the lens is fitted; but in all cases when exposure is made with this stop, it is recommended that the focus be obtained with *f*/22 or a smaller stop.

Revised Prices and Sizes of the Patent Concentric Lenses.

Numerous testimonials of a highly congratulatory nature have been received from purchasers.

No.	Size of Plate.	Equivalent Focus.	Prices. Brass Settgs. with Wheel or Iris Stops.	Alum. Sttgs. with Wheel or Iris Stops.	Flanges.
1	3 × 3	3 inches.	£3 5 0	£4 0 0	No. 1
2	4¼ × 3¼	4 ,,	3 10 0	4 5 0	,, 1
3	5 × 4	5 ,,	4 10 0	5 5 0	,, 1
4	6½ × 4¾	6 ,,	5 10 0	6 5 0	,, 1
5	8 × 5	7 ,,	6 10 0	7 5 0	,, 2
6	8½ × 6½	8 ,,	7 10 0	8 10 0	,, 3
7	9 × 7	9 ,,	8 10 0	9 10 0	,, 3
8	10 × 8	10 ,,	9 10 0	10 15 0	,, 4
9	12 × 10	12 ,,	11 10 0	12 15 0	,, 4
10	15 × 12	15 ,,	14 0 0	16 0 0	,, 6
11	18 × 16	18 ,,	17 0 0	20 0 0	,, 8

These Lenses have been very favourably commented upon by the Photographic and general press.

FIVE PER CENT DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

Ross' Wide-Angle Symmetrical Lenses

(NEW SERIES)

FOR LANDSCAPES, ARCHITECTURE, AND USE IN CONFINED SITUATIONS.



ROSS' WIDE-ANGLE SYMMETRICAL.

U.S. Nos.	16	32	64	128	256
Ratio of Stops.	$\frac{f}{16}$	$\frac{f}{22{\cdot}6}$	$\frac{f}{32}$	$\frac{f}{45{\cdot}2}$	$\frac{f}{64}$

These Lenses, like the Symmetricals of the Rapid and Extra-Rapid Series, are remarkably free from distortion and flare, and give sharp definition. They are constructed for 90° and upwards, a wider angle, perhaps, than given by any wide-angle lenses hitherto issued, giving equal definition at the margin of the plate. These Lenses are confidently recommended for architectural subjects, for all wide-angle work, and for use in confined situations.

REVISED PRICES, SIZES, &c., OF THE WIDE-ANGLE SYMMETRICAL LENSES.

No.	Size of Plate.	Size of Plate with full Aperture.	Equ. Focus.	Price. Brass Settings.	Price. Aluminium Settings.	Flanges.
*1	5 × 4	4¼ × 3¼	3 ins.	£3 0 0	£3 15 0	No. 1
*2	7¼ × 4½	5 × 4	4 ,,	3 5 0	4 0 0	,, 1
*3	8½ × 6½	6½ × 4¾	5 ,,	3 15 0	4 10 0	,, 1
4	10 × 8	8½ × 6½	6 ,,	4 10 0	5 10 0	,, 2
5	12 × 10	10 × 8	7 ,,	6 0 0	7 0 0	,, 3
6	13 × 11	12 × 10	8 ,,	7 0 0	8 0 0	,, 4
7	15 × 12	13 × 11	9 ,,	9 0 0	11 0 0	,, 5
8	18 × 16	15 × 12	12 ,,	13 0 0	15 10 0	,, 8
9	22 × 18	18 × 16	14 ,,	17 0 0	22 0 0	,, 10
10	25 × 22	22 × 18	16 ,,	24 0 0	30 0 0	,, 13

This Series cannot be fitted with Iris Diaphragms. See note at foot of pages.

* *These Lenses are supplied accurately paired for Stereoscopic purposes.*

Rotary Diaphragms only are supplied, as there is not sufficient space between the front and back combinations to introduce the Iris diaphragm.

FIVE PER CENT DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

NEW SERIES.

ROSS' RAPID HAND-CAMERA

And Stereoscopic Lenses.



F-8 HAND CAMERA LENS. 5-INCH FOCUS. FULL SIZE.

In consequence of the ever-increasing popularity of Hand Cameras, a demand has arisen for a superior class of Rapid Lens of short focus and moderate cost. Specially to meet this demand, Ross, Ltd., are introducing a series of Lenses admirably adapted for such work, and also very suitable for Stereoscopic and general Photography.

These Lenses cover well with full aperture, the F 8 series embracing an angle of about 60 degrees; they are absolutely free from distortion and flare, and combine great depth of focus with flatness of field.

LONDON PRICES IN BRONZED OR LACQUERED BRASS SETTINGS.

No.	Focus.		Plate Covered.		£ s. d.	Francs.	$	Cable Word.
	Inches.	m/m.	in.	c/m.				
1	3	75	2½ × 2	7 × 5	2 10 0	63	12	Abana.
2	4½	114	3¼ × 3¼	9 × 8	3 0 0	75	15	Abner.
3	5	127	4¼ × 3¼	12 × 9	3 10 0	88	17	Adina.
4	5½	140	5 × 4	13 × 10	3 15 0	94	19	Adonis.
5	6	152	5 × 4	13 × 10	4 0 0	100	20	Amalek.
6	8	205	7 × 5	18 × 13	5 0 0	125	25	Antioch.
			SERIES F/5.657 WHEEL OR IRIS DIAPHRAGMS.					
7	4½	114	3¼ × 3¼	9 × 8	4 0 0	100	20	Ariel.
8	6	152	4¼ × 3¼	12 × 9	5 0 0	125	25	Aroer.
9	9	230	7 × 5	18 × 13	7 10 0	187	37	Azolus.

These Lenses can be supplied accurately paired for Stereoscopic work without extra charge.

FIVE PER CENT DISCOUNT FOR CASH.

New Series has been most favourably received, and many letters have come to hand bearing witness to the excellence of the Lenses and their suitability for their special work.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

MANUFACTORY—CLAPHAM COMMON.

ROSS'
IMPROVED PORTRAIT LENSES



ROSS' IMPROVED PORTRAIT LENS.

THESE LENSES are constructed on the Petzval formula to give all the sharpness that can be optically obtained, and enlargements from small negatives may be produced with them, which will compare favourably with others of the same size taken direct with a large lens. This is the most severe test of their defining power.

When a Portrait Lens is used for standing figures, it is desirable to employ one of longer focus than necessary to cover the plate, as it can be worked with a larger stop, and consequently with greater rapidity.

No. 1 and No. 2 Portrait Lenses are not now made, having been superseded by the Carte-de-Visite and Cabinet Lenses, which give a flatter field and better marginal definition.

No. 3 Portrait Lens, lenses 3½ inches in diameter, back focus 10 inches. Produces fine Portraits on plates 6½ × 4¾. Price	£16	10	0
No. 3A Ditto ditto, lenses 4 inches diameter, 12 inches back focus, for pictures on plates ½ · 6½ inches and under ... Price	26	0	0
No. 4 Ditto ditto, lenses 4½ inches diameter, 15 inches back focus, for pictures on plates 10 × 8 inches and under ... Price	36	0	0
No. 5 Ditto ditto, lenses 5 inches diameter, 20 inches back focus, for portraits on plates 15 × 12 and under... ... Price	40	0	0
No. 6 Ditto ditto, lenses 6 inches diameter, 24 inches back focus, for portraits on plates 18 × 16 and under... ... Price	50	0	0

The above prices include a set of Waterhouse Diaphragms in morocco case.

These Lenses are admirably adapted for Vignettes, Half-lengths, and Sitting Figures, but for Full-lengths the Cabinet Series is preferable, having a flatter field.

FIVE PER CENT DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

ROSS'
Rapid 'Cabinet' and 'Carte-de-Visite' LENSES.



NO. 3 CARTE-DE-VISITE LENS, QUARTER-SIZE.

ROSS' 'Cabinet' and 'Carte Lenses differ from ordinary Portrait Lenses in being constructed to give as flat a field as is consistent with good marginal definition. They are invaluable for the production of either standing or sitting figures with full aperture, and give very rapid results with brilliancy and exquisite defining power.

CABINET LENSES.

No. 1 Cabinet Lens, 2¾ inches clear aperture, 6 inches focus; should be placed 14 feet from the sitter	£12 0 0
No. 2 Ditto ditto, 3¼ inches clear aperture, 8 inches focus; should be placed at 18 feet from the sitter	16 10 0
No. 3 Ditto ditto, 3⅞ inches clear aperture, 10 inches focus; should be placed at 20 feet from the sitter	18 10 0

The above prices include a set of Waterhouse Diaphragms in morocco case.

In choosing a Cabinet Lens the same rule applies as in the selection of a *Carte* Lens—viz., that for obtaining the best results it is desirable to use No. 3 when the Studio exceeds 20 feet in length. Many of the finest Cabinet portraits from the first Studios in Paris, London, and New York are taken with this Lens.

FIVE PER CENT DISCOUNT FOR CASH.

CAUTION.

EVERY Lens sent out is engraved 'ROSS, LONDON,' with its stock number, by which it can be verified in the Lens Register. Large numbers of Lenses purporting to be of Ross' manufacture, but which are worthless imitations, are frequently palmed off on the unwary. Ross, Ltd., therefore find it necessary to caution Amateur and Professional Photographers to beware of such fraudulent imitations, and to purchase from the manufacturers direct or through respectable recognised dealers.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

Ross' Universal Symmetrical Lenses.

(NEW SERIES (F 5, 657), EXTRA RAPID)

For Landscapes, Portraits, Groups, and Instantaneous Pictures,

And every description of Studio & Outdoor Photography.

U.S. Nos.	2	4	8	16	32	64	128	256
Ratio of Stops...	$\frac{f}{5{\cdot}657}$	$\frac{f}{8}$	$\frac{f}{11{\cdot}3}$	$\frac{f}{16}$	$\frac{f}{22{\cdot}6}$	$\frac{f}{32}$	$\frac{f}{45{\cdot}2}$	$\frac{f}{64}$



ROSS' UNIVERSAL SYMMETRICAL.

These Lenses work with double the rapidity of the Rapid Symmetricals. They are the result of exhaustive calculations, are constructed of Special Jena Glass, are perfectly aplanatic, giving brilliant portraits, groups, and other suitable subjects, with full aperture. They are therefore adapted for Studio work, and when stopped down to the same extent as the Rapid Symmetricals are suitable for all kinds of Outdoor Photography, Copying, and Enlarging. Their great rapidity renders them specially useful for obtaining fully exposed instantaneous pictures with rapid shutters, and the smaller sizes are invaluable for use in Detective Cameras.

These Lenses are furnished with Waterhouse Diaphragms, or with Ross' Improved 'Iris,' at the same price. They are great favourites with Professional Photographers.

REVISED PRICES OF THE UNIVERSAL SYMMETRICAL LENSES.

Size of View with Medium Stop.	Size of Group. f/11	Plate Covered full Aperture.	Equiv. Focus.	Price in Rigid Settings. With Iris Diaphrgms.	Price in Rigid Settings. Aluminium Settings.	Flanges.
5 × 4	4¼ × 3¼	3½ × 3½	6 ins.	£6 0 0	£7 0 0	No. 2
6 × 5	5 × 4	4¼ × 3¼	7½ ,,	7 10 0	9 0 0	,, 3
8 × 5	6 × 5	5 × 4	9 ,,	8 10 0	10 0 0	,, 4
8½ × 6½	8 × 5	6 × 5	10½ ,,	9 10 0	11 10 0	,, 5
9 × 7	8½ × 6½	8 × 5	12 ,,	12 0 0	14 0 0	,, 6
10 × 8	9 × 7	8½ × 6½	14 ,,	14 0 0	17 0 0	,, 8
12 × 10	10 × 8	9 × 7	16 ,,	17 0 0	21 0 0	,, 9
13 × 11	12 × 10	10 × 10	18 ,,	19 0 0	25 0 0	,, 11
15 × 12	13 × 11	12 × 10	20 ,,	24 0 0	32 0 0	,, 14
18 × 16	15 × 12	13 × 11	24 ,,	32 0 0	42 0 0	,, 16
22 × 18	18 × 16	15 × 12	30 ,,	50 0 0	65 0 0	—

FIVE PER CENT DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

MANUFACTORY—CLAPHAM COMMON.





PHOTOGRAPHIC LENS CASES.

Morocco or Russia leather, with pull-off lids, lined with velvet, 3/6 to 7/6 according to size.

Solid leather lens cases in all sizes made to order.

FOCUSSING MAGNIFIERS.

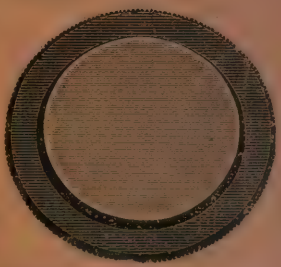
Finest Achromatic, with screw adjustment and clamping collar :—

Brass mount	15/-
Aluminium	21/-
Ordinary magnifiers from	5/- to 10/6

Isochromatic Screens.

Worked Optically-plane.

Mounted in Brass Screw-ring to fit into back cell of lens, or mounted in Leather Cap to fit lens hood. The first method is recommended. When ordering please give the exact outside diameter of the back lens cell, or forward the back combination of the lens itself.



Dia. of cell or hood...	1¼in.	2in.	2¼in.	3in.	3¼in.
Price of Screen & Mount	5/-	6/6	7/6	10/-	12/6
Case for ditto ...	2/-	3/-	3/6	4/6	5/-

THE ABOVE PRICES ARE NET.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

PRICE LIST of the THORNTON-PICKARD SHUTTERS.

To fit on a Lens Hood or Tube up to Inches Diameter—	1½	1⅝	2	2½	3	3½	4	4½	5
TIME & INSTANTANEOUS. STANDARD PATTERN	18/6	18/6	20/6	23/6	27/6	32/6	37/6	42/6	47/6
Do. do. do. BEHIND LENS... ...	21/-	21/-	23/-	26/-	31/-	36/-	41/-	46/-	51/-
Speed Indicator, 3/6 extra.									
For HAND CAMERAS, with Cord Release.									
TIME AND INSTANTANEOUS	17/6	17/6	19/6	—	—				
Do. do. with SELF-CAPPING BLIND	22/6	22/6	24/6	—	—				
SNAP SHOT	9/-	9/-	11/-	—	—				
Do. with SELF-CAPPING BLIND	14/-	14/-	16/-	—	—				
Speed Indicator, 3/6 extra.									
STEREOSCOPIC.									
TIME AND INSTANTANEOUS	26/-	26/-	28/-	31/-	—				
Do. do. BEHIND LENS...	29/6	29/6	31/6	34/6	—				
Do. do. BEHIND LENS, with ADJUSTABLE CENTRES (adjustment from 2¾ to 3¼ in.	34/6	34/6	36/6	39/6	—				
Speed Indicator, 3/6 extra.									
These prices are for Stereoscopic Shutters up to 3¼ in. centres. If 3½ in. centres, 2/- extra; 3¾ in. centres, 4/- extra.									
SNAP SHOT, *for Instantaneous only*	10/-	10/-	12/-	15/-	—	—	—	—	—
Speed Indicator, 3/6 extra.									
SPECIAL, *for more Rapid Instantaneous*	—	23/6	25/6	28/6	32/6	37/6	42/6	47/6	52/6
Speed Indicator, 3/6 extra.									



5 × 4	2 0 0	7 × 5	2 10 0	10 × 8	3 10 0	13 × 18 „	2 12 6
6½ × 4¼	2 5 0	7½ × 5	2 12 6	12 × 10	4 10 0	18 × 24 „	3 5 0
6¾ × 3¼	2 10 0	8 × 5	2 17 6	15 × 12	5 10 0	24 × 30 „	4 5 0

Speed Indicator, 3/6 extra.

Intermediate sizes are made to order at same price as next size larger.

ACCESSORIES.

SPEED INDICATOR, price **3/6** extra. Strongly recommended with all except the Studio Shutter.

Pneumatic Ball and Tube, Ordinary Size, No. 0 (Ball, Tube, and Teat complete), price **1/6.**
Do. do. No 1, for Studio Shutter Do do. price **2/-.**
Do. do. Large Balls and Long Lengths of Tubing, to Order.

Patent Rubber Moulding, for fitting Shutters to Lenses, made in seven different thicknesses, **8d.** per foot.

Adapters, for fitting Shutters to more than one Lens: RUBBER, **8d.** each; WOODEN, lined with Rubber, **1/6** up to 2½ in., **2/-** if larger.

Brass-binding Shutters, for hot and damp climates, **5/-** extra up to 3 in. size; larger sizes in proportion.

Self-Capping Blind, up to 2½ in. size, price **5/-**; up to 3½ in., **7/6**; fitted to Time and Instantaneous or Snap Shot Shutters. To other patterns, from **7/6.**

Aluminium Fittings to Time and Instantaneous Shutters, **5/-** extra.

Extra Panels or Behind-Lens Shutters, ordinary patterns, up to 2½ in. size, **1/6**; 3½ in. size, **2/-**; 5 in. size, **2/6.**
Do. do. do. Stereoscopic pattern, **2/-**; with adjustable centres, **5/-**

INSTRUCTIONS FOR ORDERING.

For Ordinary Shutters.—Please send a narrow strip of paper just long enough to meet round the Lens Hood or Tube, NOT an impression or pencil drawing. Insist upon having the Shutter made a good fit upon the Lens. The Shutters work equally well fitted to the Lens Hood or the Lens Body.

For Stereoscopic Shutters.—In addition to strip as above, please state exact distance apart of Lenses from centre to centre.

For Focal Plane Shutter.—This Shutter is fitted into the back of the Camera in the same way as the Reversible Back, and, in fact, takes the place of it. The Dark Slide or Plate Holder fits into the back of the Shutter in the usual manner.

The cost of fitting is included if the Reversible Back with Focussing Screen and a Dark Slide or Plate Holder are sent to us when ordering, otherwise we supply the Shutter with an adapting frame, which may be cut down and fitted to the required size by any cabinet-maker. If the Camera has no Reversible Back it is sufficient to send a Dark Slide or Plate Holder.

FIVE PER CENT DISCOUNT FOR CASH.

ROSS, Limited, 111 NEW BOND STREET, LONDON, W. (Corner of Brook Street). Manufactory—Clapham Common.

BAUSCH & LOMB'S
*Diaphragm * Shutter.*

NEW MODEL—SILENT WORKING.



MADE entirely of metal with scale of times from 3 seconds to $\frac{1}{100}$ second. Any greater length of exposure may be given by fixing the shutter for time and keeping the ball compressed. The setting of the shutter does not open it; this may therefore be done when the sensitive film is exposed. This shutter fits between the combinations of the lens to replace the ordinary tube, and is furnished with an Iris diaphragm and two releases: one, a pneumatic ball, and the other, a trigger to be worked by the hand. Either can be used at will.

PRICE LIST.

Size.	Largest aperture.	Made in Brass.	Made in Aluminium.
5 × 4	$\frac{3}{4}$ in.	£3 0 0	£3 15 0
½-plate and 7½ × 5	1½ ins.	3 5 0	4 0 0
8½ × 6½	1 $\frac{7}{8}$ ins.	3 10 0	4 10 0
10 × 8	1¾ ins.	4 0 0	5 10 0

When these shutters are supplied with new lenses the ordinary tube is not given, and the above is added to the cost of lens.

To fit shutters to old lenses an extra cost for fitting is made of—5 × 4 and ½-plate, 10*s*., 10 × 8, 15*s*.

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.



THURY & AMEY
DIAPHRAGMATIC SHUTTER.

(Supplied to order only.)

THIS Shutter works between the optical combinations of the lens, and consists of two metal plates, each perforated with a circular opening, and moving simultaneously in opposite directions. In this way the exposure commences and finishes in the centre, thus utilising the light to the greatest extent in the least possible time.

It works by either pneumatic release or trigger, and the different parts being well balanced, there is no vibration during exposure; it works equally well in the horizontal or vertical positions.

With the medium sizes an exposure of $\frac{1}{200}$th of a second may be obtained, but the time may be increased by means of the brake to one second or more.

In fitting, the original lens mount is not used, and is thus available should the owner wish to use the lens at any time without the shutter.

No.	Diameter of Opening. m/m	in.	Price without Stops.	Extra. Price with Set of Five Stops.
1	20	$\frac{3}{4}$	£3 10 0	£0 5 0
2	30	$1\frac{1}{4}$	3 15 0	0 5 0
3	40	$1\frac{5}{8}$	4 0 0	0 6 6
4	50	2	4 10 0	0 7 6
5	60	$2\frac{3}{8}$	5 5 0	0 10 0
6	90	$3\frac{1}{2}$	6 10 0	0 12 6

Stereoscopic Shutters for Lenses up to $\frac{3}{4}$ in. largest aperture ... £5 5 0

" " " $1\frac{1}{4}$ " " ... 8 0 0

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET)

MANUFACTORY—CLAPHAM COMMON.

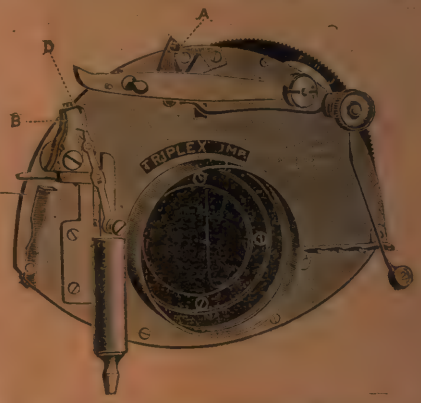
THE TRIPLEX IMPROVED SHUTTER.

FEATURES OF THE IMPROVEMENT.

A New Release, by which the pneumatic is entirely detached from any connexion with the lever-bar during instantaneous exposures.

Four Springs are furnished with each shutter, instead of two as heretofore, giving, in connexion with the new release, the great range of exposures shown in the

Speed Card, furnished with each shutter, which has been compiled after a series of careful tests, and is approximately as correct as anything of the kind can be.



The Triplex Improved being fitted between the combinations of the lens, each shutter also contains an entirely new lens tube, the original lens tube or barrel not being cut in any way, unless specially ordered, but returned intact.

Rotary stops are fitted to all shutters when possible. Shutters may also be adapted for use with Waterhouse or plain stops, same price.

Shutters are fitted, unless otherwise ordered, having same full opening as lens.

We prefer, under all circumstances, to have at least customer's lens tube, and do not guarantee fit unless we have complete lens. Where the lenses come very close together, as in the Zeiss and Goerz lenses, we must have *entire* lens.

We would point out that the very small space needed between the combinations for shutter renders the Triplex Improved well adapted for such lenses as the Zeiss, Goerz, &c., when there is but slight room.

PRICE LIST OF 'TRIPLEX IMPROVED' SHUTTERS.

Size...	...	oo	o	oA	1	1A	2	2A	3	3A	4	5	6	7	8
Aperture in		⅜	½	¾	1	1¼	1½	1¾	2	2¼	2½	3	3½	4	
Price	...	55/-	57/6	60/-	62/6	65/-	70/-	72/6	75/-	80/-	90/-	100/-	115/-	140/-	160/-
Extra for Aluminm.		15/-	17/6	20/-	20/-	20/-	25/-	27/6	30/-	30/-	—	—	—	—	—

N.B.—When the combinations of lens come so close together that it is necessary to fit stop *inside of shutter case*, extra 7/6.

FIVE PER CENT DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET),
MANUFACTORY—CLAPHAM COMMON.

Table for Finding the Minimum Length of Studio for a given Lens.

(From the *American Amateur Photographer*.)

DISTANCES IN INCHES FROM OBJECT TO LENS.

Equivalent Focus of Lens.	3 in. high.	4 in. high.	5 in. high.	6 in. high.	8 in. high.	10 in. high.	12 in. high.	16 in. high.	20 in. high.	24 in. high.	30 in. high.	36 in. high.	48 in. high.	54 in. high.	60 in. high.	72 in. high.
3 inches.....	75	57														
4 "	100	76	61⅜	52												
5 "	125	95	77	65	50											
6 "	150	114	92⅞	78	60	49¼										
8 "	200	152	123⅛	104	80	65 5/16	56									
10 "	250	190	154	130	100	82	70	55								
12 "	300	228	184⅜	156	120	98⅛	84	66	55½							
16 "	400	304	246⅝	208	161	131⅛	112	88	72⅜	64	54⅜	48				
20 "	500	380	308	260	200	164	140	110	90¾	80	68	60	50	46⅜		
24 "	600	456	369⅜	312	240	196⅛	168	132	110⅝	96	81⅞	72	60	56	52⅛	48
30 "	750	540	462	390	300	246	210	165	136⅛	120	102	90	75	70	65	60
36 "	900	684	554⅞	463	360	307⅛	252	198	165⅝	144	122⅞	108	90	84	79⅛	72
48 "	1200	912	739⅛	624	480	393⅛	336	264	220⅛	192	163⅛	144	120	112	105⅜	96
60 "	1500	1080	1024	780	600	492	420	330	272⅛	240	204	180	150	140	132	120
72 "	1800	1368	1108⅛	933	720	614⅜	504	396	321⅛	288	244⅛	216	180	168	158⅜	144

DISTANCES IN INCHES FROM LENS TO GROUND GLASS.

Equivalent Focus of Lens.	3 in. high.	4 in. high.	5 in. high.	6 in. high.	8 in. high.	10 in. high.	12 in. high.	16 in. high.	20 in. high.	24 in. high.	30 in. high.	36 in. high.	48 in. high.	54 in. high.	60 in. high.	72 in. high.
3 inches.....	3⅛	3⅛														
4 "	4⅛	4⅜	4 5/16	4⅛												
5 "	5 5/16	5 5/16	5⅜	5 5/16	5⅜											
6 "	6⅜	6¼	6 5/16	6½	6⅞	7⅛										
8 "	8¼	8⅜	8⅜	8⅜	8⅜	9⅛	9¼									
10 "	10 5/16	10⅜	10⅜	10⅜	10⅜	11⅛	11⅞	12⅞								
12 "	12⅛	12⅜	12⅛	13	13⅛	13⅞	14	14⅜	15⅛							
16 "	16⅜	16⅜	17⅛	17⅛	17⅞	18⅜	18⅜	19⅜	20⅛	21⅛	22⅞	24				
20 "	20⅜	21⅛	21 7/16	21⅞	22⅜	22⅞	23⅛	24⅛	25 5/16	26⅜	28⅛	30	33⅛	35		
24 "	25	25⅛	25⅜	26	26⅞	26⅜	28	29⅛	30⅞	32	34	36	40	42	44	48
30 "	31½	31⅜	32 1/16	32½	33⅜	34⅛	35	36⅜	38⅛	40	42½	45	50	52½	55	60
36 "	37⅛	38	38⅛	39	39⅞	40	42	44	46	48	51	54	60	63	66	72
48 "	50	50⅜	51⅛	52	53⅛	54⅞	56	58⅜	61⅛	64	68	72	80	84	88	96
60 "	62⅛	63⅛	64⅛	65	66⅜	68⅛	70	73⅛	77⅜	80	85	90	100	105	110	120
72 "	75	76	77	78	79⅛	80	84	88	92	96	102	108	120	126	132	144

Suppose the lens used is 24 in. equiv. focus, and you wish to make a full-length portrait of a man six feet high, in which the image will be six inches high. Look at the left-hand column for lens focus, and in the top line for size of image. At the intersection of these columns we find 312 inches=26 feet, to be the distance the person must stand from the lens. In the next table, using the same lens and size of image as before, at the intersection of the columns we find twenty-six inches, which represents the distance of the ground glass from lens centre. And in the same way any lens and size of image may be computed for.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

IMPORTANT NOTICE.

To American Photographic Dealers and Amateur and Professional Photographers.

ROSS' Portrait and View Lenses,
ROSS' Zeiss Anastigmatic Lenses,
ROSS' Goerz Double Anastigmats,
AND
ROSS' New Hand-Camera Lenses.

ARE NOW SOLD AT

ENGLISH CATALOGUE PRICES

With the New Import Duty of 45% only added,

BY

G. GENNERT,

24 and 26 East 13th Street, New York.

(SOLE UNITED STATES IMPORTER.)

WHO KEEPS IN STOCK A LARGE SELECTION OF ROSS' LENSES,

and who will Execute all Orders with the utmost Dispatch.

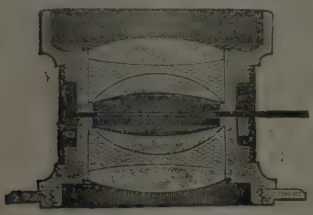
ROSS' LENSES may also be obtained from the Leading Photographic Stock Dealers throughout the World.

Ask for Lenses manufactured by Ross, Ltd., and see that you get them.

Catalogues Mailed Free on Application.

GOERZ' PATENT
Double Anastigmat Lenses

The introduction of the DOUBLE ANASTIGMATS constitutes undoubtedly one of the greatest advances of late years in Photographic Lenses. They are absolutely free from astigmatism, covering perfectly with the largest stop (about F 8) the sizes indicated, the definition being equal over the whole plate. The Double Anastigmats of the Series III. include an angle of over 70°, and excel all other lenses in marginal definition when so large an angle is included with the full aperture.



The Double Anastigmat is characterised by complete absence of distortion and flare, while, from the universality of its capabilities, it will be found the most useful Lens either Amateur or Professional Photographer can possess.

They have been pronounced the very acme of perfection by numerous purchasers.

ROSS, Ltd., Opticians,

111 NEW BOND STREET, LONDON, W.

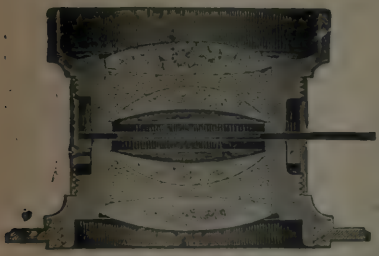
(CORNER OF BROOK STREET.)

MANUFACTORY—CLAPHAM COMMON.

SOLE MANUFACTURING LICENSEES FOR THE BRITISH EMPIRE.

For Prices and Sizes see the following pages.

The Double Anastigmat



(GOERZ' PATENT.)

SERIES III.

MANUFACTURED BY

ROSS, Limited.

THE DOUBLE ANASTIGMAT, F 7.7.

This is a Universal Lens and is highly suitable for Portraits, Groups, Instantaneous Work, and Architecture. The Double Anastigmat permits the use of the largest stop without diminishing the sharpness of the image at the extreme margins of the plate up to an angle of 70°. By the use of a smaller stop an angle of 90° is obtained. Definition, brilliancy, and flatness of field are uniform all over the picture.

SIZES AND PRICES.

No.	Equiv. Focus	Plate covered. F 8. *	Plate covered. F 16. *	Plate covered. F 64. *	Price with Waterhouse stops.			Price with Iris diaphragms.		
	ins.	ins.	ins.	ins.	£	s.	d.	£	s.	d.
00	4	3 × 3	4¼ × 3¼	5 × 4	4	5	0	5	0	0
0	5	4½ × 3¼	5 × 4	6½ × 4¾	4	10	0	5	5	0
1	6	5 × 4	6½ × 4¾	8 × 5	5	10	0	6	5	0
2	7	6½ × 4¾	8 × 5	8½ × 6½	6	10	0	7	5	0
3	8¼	8 × 5	8½ × 6½	9 × 7	8	0	0	8	15	0
4	9½	8½ × 6½	9 × 7	10 × 8	9	15	0	10	10	0
5	10½	9 × 7	10 × 8	12 × 10	12	0	0	12	15	0
6	12	10 × 8	12 × 10	15 × 12	14	10	0	15	5	0
7	14	12 × 10	15 × 12	18 × 16	18	15	0	19	15	0
8	19	15 × 12	18 × 16	22 × 18	30	0	0	31	0	0
9	24	18 × 16	22 × 18	25 × 22	45	0	0	46	0	0
10	30	22 × 18	25 × 22	30 × 24	75	0	0	76	5	0
11	35	25 × 22	30 × 24	36 × 28	150	0	0	151	5	0

* The plates indicated as covered with F 8, F 16, and F 64, are rather under the Continental sizes given in the Patentee's list, and therefore the lenses may be advantageously used for the next larger sizes of plates under favourable conditions.

A charge of 8/- extra is made for pairing two lenses for stereoscopic work.

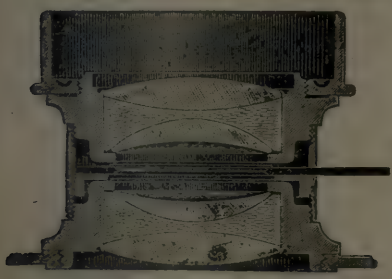
THE ABOVE PRICES ARE NET.

ROSS, Limited, Opticians, 111 New Bond Street, LONDON, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

THE DOUBLE ANASTIGMAT.



(GOERZ' PATENT.)

SERIES IV.

MANUFACTURED B

ROSS, Limited.

F 11.

THE DOUBLE ANASTIGMAT,

This is a Wide-Angle Lens especially suitable for Copying, Enlarging, Architecture, Interiors, Groups, &c. The angle of clearly defined image, with the largest aperture, includes 75°, so that it may be employed for wide-angled instantaneous views, groups, and architectural work. With a smaller stop, it will define with uniform sharpness up to the margins of a plate whose diagonal is equal to twice the focus of the lens, thus including an angle of 90°.

SIZES OF PLATES COVERED, AND PRICES.

No.	Equiv. Focus.	For Reproduction. *F* 16–*F* 22.	For Enlarging. *F* 16–*F* 22.	For Groups. *F* 11.	With Smaller Stops.	Prices with Waterhouse Stops.			Prices with Iris.		
	In.	Inches.	Inches.	Inches.	Inches.	£	*s.*	*d.*	£	*s.*	*d.*
6	12	18 × 16	12 × 10	12 × 10	18 × 16	15	10	0	16	5	0
7	14	22 × 18	15 × 12	15 × 12	22 × 18	20	0	0	20	15	0
8	19	25 × 22	18 × 16	18 × 16	25 × 22	32	10	0	33	5	0
9	24	30 × 24	22 × 18	22 × 18	30 × 24	48	15	0	49	15	0
10	30	36 × 28	25 × 22	25 × 22	36 × 28	80	0	0	81	0	0
11	35	44 × 34	30 × 24	30 × 24	44 × 34	155	0	0	156	0	0
12	47	60 × 40	36 × 28	36 × 28	60 × 40	280	0	0	281	5	0

The note at bottom of Series III., respecting plates covered, applies equally to the Series IV. Lenses.

The above Prices are Net.

ROSS, Limited, Opticians, 111 New Bond Street, LONDON, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.



ROSS-GOERZ'
DOUBLE
ANASTIGMATIC
LENSES.

With Iris Diaphragms and Focussing Jackets.

(SERIES III.—F 7.7.)

THE smaller sizes of Series III., ROSS-GOERZ Double Anastigmats, are particularly well adapted for Hand Camera work; at full aperture they cover sharply up to the corners of a plate whose longest side is equal to the focus. To facilitate the adaptation of these lenses to Hand or Detective Cameras which have no focussing adjustment, Ross, Limited, are now prepared to supply them to order, mounted in special settings, fitted with Iris diaphragms and a very convenient worm focussing screw, with scale marked off for various distances.

No.	Equiv. Focus. Ins.	Size of Plate Sharpiy Covered at f/7.7. Ins.	f/16. Ins.	f/64. Ins.	Code Word.	Price with Iris Diaphragm. £ s. d.
0	5	$4\frac{1}{4} \times 3\frac{1}{4}$	5 × 4	$6\frac{1}{2} \times 4\frac{3}{4}$	Corso	6 0 0
1	6	5 × 4	$6\frac{1}{2} \times 4\frac{3}{4}$	8 × 5	Courant	7 5 0
2	7	$6\frac{1}{2} \times 4\frac{3}{4}$	8 × 5	9 × 7	Cuba	8 5 0

The cost of pairing two lenses for Stereoscopic Work is 8/-

If customers require special scales divided off, they will be charged extra.

THE ABOVE PRICES ARE NET.

ROSS, Limited,

Manufacturing Opticians,

111 NEW BOND STREET, LONDON, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

NEW SECTOR SHUTTER

(GOERZ' PATENT).

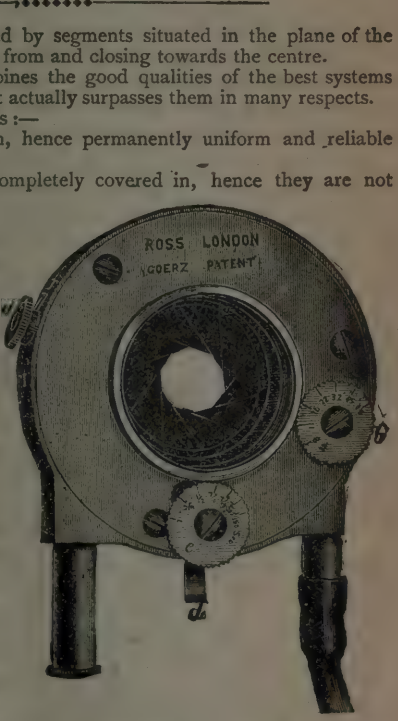
THIS new Shutter is formed by segments situated in the plane of the diaphragm, and opening from and closing towards the centre.

This Shutter not only combines the good qualities of the best systems of Shutters hitherto known, but actually surpasses them in many respects.

Its advantages are as follows :—

1. Simplicity of mechanism, hence permanently uniform and reliable action.

2. All moving parts are completely covered in, hence they are not susceptible to disturbing external influences, such as concussion, dust, moisture, &c.



3. It can be fitted between lens systems which have very little separation from each other (*e.g.*, double anastigmats with short focus), as the segments are one-tenth of a millimetre only in thickness.

4. After opening with the greatest velocity it will remain for a certain period in this fully-opened position, thereupon closing with the same rapidity. Hence the Lens will work during the greater part of the time of exposure with the full size of opening for which it is set.

5. It will work without any shock or jerk, and permits, with certainty, great variations of speed, ranging from $\frac{1}{100}$ to one second. The speeds marked on the Shutter are absolutely reliable, and will apply equally for any adjustment or "size of stop." In most Shutters hitherto known the speed will vary with the "size of stop," for which they are set, even without any alteration of the speed adjustment.

6. It serves at the same time as a "stop," and can be adjusted for any desired "size of aperture."

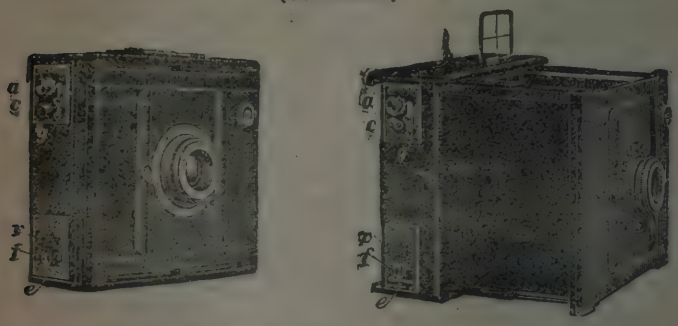
7. It is set for action without opening it in doing so.

8. It is perfectly light-proof, its manipulation is most simple, and it is very light, being made of aluminium (Nos. 1 to 4 weigh 80 grammes only); it occupies very little space (see illustration showing full size). The workmanship is most perfect.

The Shutter being fitted between the lenses, it is necessary that it should

THE ANSCHÜTZ HAND OR STAND CAMERA.

(Continued.)



SIZES AND PRICES.

FOR PLATES 4¼ × 3¼.

Camera with Focal Plane Shutter, but without Lens	£4	3	0
No. 0, Series III., Double Anastigmat, with Iris Diaphragm and Focussing Adjustment	6	0	0
Six Double Dark Slides with Aluminium Mountings at 12/- ...	3	12	0
Leather Case	0	15	0
	£14	10	0

FOR PLATES 6½ × 4¾.

Camera with Focal Plane Shutter, but without Lens	£5	9	0
No. 2, Series III., Double Anastigmat, with Iris Diaphragm and Focussing Adjustment	8	5	0
Six Double Dark Slides at 16/-	4	16	0
Leather Case	1	0	0
	£19	10	0

ACCESSORIES.

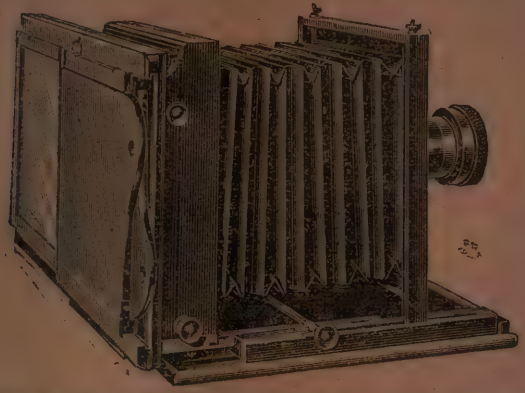
	For 4¼ × 3¼ Camera.	For 6½ × 4¾ Camera.
Changing Box for 12 Plates	£1 10 0	£2 0 0
Tripod Stand with Ball and Socket Top ...	1 4 0	1 4 0
Ball and Socket Top only	0 10 0	0 10 0

THE ABOVE PRICES ARE NET.

For FULL PARTICULARS see HANDBOOK, sent free on application.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
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MANUFACTORY—CLAPHAM COMMON.

ROSS' IMPROVED STUDIO CAMERAS.



IMPROVED UNIVERSAL STUDIO CAMERAS.

For Lenses of long focus, with repeating back and inner frames.

Size.		Size.		With Single Swing Back.	With Double Swing Back.	Brass Binding.
6½ × 6½	for Plates	6½ × 4¾	and under	£6 0 0	£7 0 0	£1 5 0
8½ × 8½	"	8½ × 6½	"	7 5 0	8 5 0	1 5 0
9 × 9	"	9 × 7	"	7 15 0	8 15 0	1 5 0
10 × 10	"	10 × 8	"	8 15 0	9 15 0	1 10 0
12 × 12	"	12 × 10	"	10 10 0	11 15 0	2 5 0
15 × 15	"	15 × 12	"	15 10 0	17 10 0	2 15 0

Rack Adjustment to Swing Back, from 10s. extra for each Rack.

PORTRAIT CAMERAS, with single-back and two inner frames.

For Plates.	Square sliding body. Mahogany. Honduras.	Mahogany. Best Spanish.	Screw adjustment. With Swing Back.	Without Swing Back.	Brass Binding.
5 × 4	£1 8 0	£1 18 0	—	£2 12 0	£0 16 0
6½ × 4¾	2 0 0	2 15 0	£6 12 0	3 15 0	1 0 0
8½ × 6½	3 10 0	4 15 0	10 10 0	6 10 0	1 5 0
10 × 8	5 0 0	7 0 0	12 10 0	7 10 0	1 10 0
12 × 10	6 15 0	9 0 0	14 0 0	9 10 0	2 5 0
15 × 12	9 0 0	12 0 0	18 0 0	13 0 0	2 15 0
18 × 16	14 10 0	18 0 0	22 0 0	17 0 0	3 15 0
24 × 20	18 0 0	25 0 0	30 0 0	25 0 0	4 10 0

Repeating-backs for 2 or more pictures on one plate, from 42/- upwards.
Cones for copying, adapted, from 17/6 upwards.

FIVE PER CENT DISCOUNT FOR CASH.

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(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

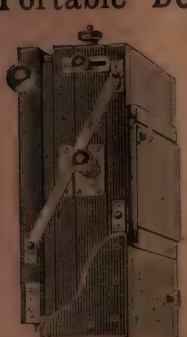
C

ROSS'

IMPROVED DRY-PLATE CAMERAS.



Portable DOUBLE-EXTENSION CAMERAS,



For Lenses of Long Focus, with Double Swing Back, one Double Slide, and extra Front. The 7½×5 size extends from 3 to 17½ inches.

Size.	Price Highest Finish.	Square, with Reversible Holder Highest Finish.	Brass Binding
5 ×4	£5 5 0	£6 0 0	18s. each.
6½×4¼	6 7 0	7 2 0	20s. ,,
7½×5	6 12 0	7 10 0	20s. ,,
8½×6½	7 18 [redacted]	8 17 6	20s. ,,
10×8	9 4 0	10 10 0	25s. ,,
12×10	10 13 0	11 10 0	30s. ,,
15×12	13 5 0	14 15 0	40s. ,,

DIVISION FOR STEREOSCOPIC VIEWS supplied with all 8½×6½ size and smaller Cameras, and with larger when desired.

RACK AND PINION ADJUSTMENT TO SWING BACK, 8½×6½ size and smaller, **5s.** for each swing extra; larger, **10s.** extra.

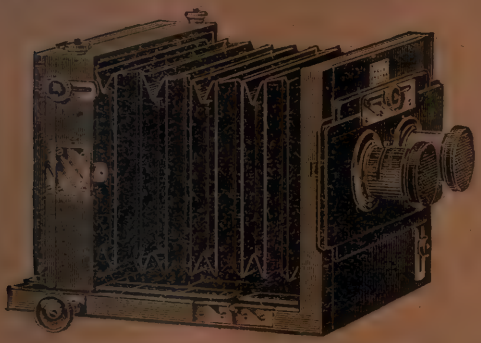
This pattern is a favourite with Professional Photographers and Process Workers, and also for Railway, Shipyard, and Engineering Photographic Work.

The Front is rigid, and therefore well adapted for carrying long focus heavy lenses, and, as the bellows racks backwards, wide-angle lenses may be employed without having the foreground of the picture cut off by the baseboard, as frequently happens with cameras of other patterns.

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

PORTABLE STEREOSCOPIC CAMERAS



Single Extension,

suitable for

Ross', Zeiss',

or Goerz'

LENSES

Of Short Focus.

The following Prices include Camera with Rack Adjustments and Swing Back, three Double Dark Slides, extra Front, and Stereoscopic Division :—

Size.	Price.	Brass Binding.	Leather Case with Lock.
$6\frac{1}{2}\times4\frac{3}{4}$	£7 0 0	£1 0 0 extra.	£1 1 0
$7\frac{1}{4}\times4\frac{1}{2}$	7 10 0	1 0 0 ,, ...	1 2 6
$7\frac{1}{2}\times5$	7 10 0	1 0 0 ,, ...	1 5 0
8×5	8 0 0	1 0 0 ,, ...	1 7 6

These Cameras are not fitted with Reversing Frames, but upright pictures may be taken by turning the camera upon its side on the tripod head.

PORTABLE STEREOSCOPIC CAMERAS,

IMPROVED FORM.



PRICE.

Size.	With one Double Slide.	With three Double Slides.
$6\frac{1}{2}\times4\frac{3}{4}$ ...	£7 2 0	£9 6 0
$7\frac{1}{2}\times5$ ...	7 10 0	9 14 0
$8\frac{1}{2}\times6\frac{1}{2}$ ...	8 17 6	11 7 6
10×8 ...	10 10 0	13 14 0

Symmetrical, Rapid Symmetrical, or Single Stereoscopic Lenses, accurately paired for use with the above Cameras.

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

ROSS' PORTABLE DOUBLE EXTENSION CAMERAS.



PATTERN No. 1.

THIS is an extremely portable Camera, combining stability and rigidity with all movements required in a really useful and reliable Apparatus. The ground-glass screen may be moved close up to the front, rendering the camera particularly suitable for wide-angle lenses, and thus obviating and cutting off of the foreground of the picture by the baseboard. The Cameras can be supplied with Turntables or plain baseboards as may be required.

PRICES OF PATTERN No. 1.

SIZE.	With one Double Back.	With three Double Backs.	Turntable and Stand.	Brass Binding Camera and Three Backs.
6½×4¾	£6 10 0	£8 14 0	£1 17 6	£1 10 0
7½×5	7 10 0	9 14 0	1 17 6	1 10 0
8½×6½	8 0 0	10 10 0	1 17 6	1 15 0
10 ×8	9 0 0	12 4 0	2 0 0	2 0 0
12 ×10	11 10 0	15 10 0	2 5 0	2 10 0
15 ×12	14 10 0	20 0 0	2 10 0	3 0 0
18 ×16	22 0 0	29 10 0	2 15 0	4 0 0

Extra Charge for Complete Aluminium Fittings, including Turntable.

6½×4¾	7½×5	8½×6½	10×8	12×10	15×12	18×16
£2 15s.	£3	£3 10s.	£4	£5	£6	£7 10s.

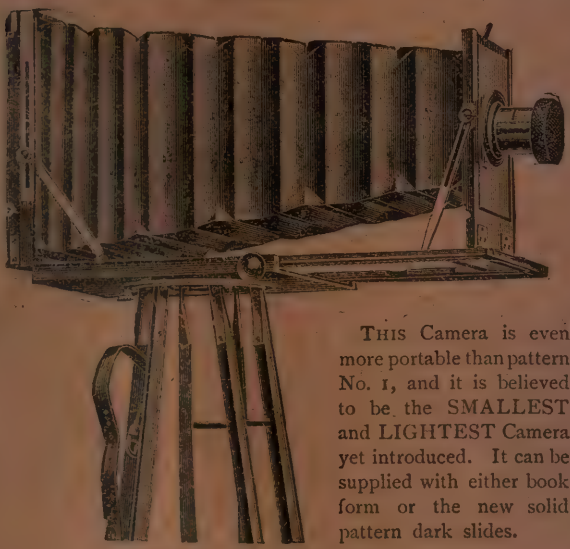
FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

PORTABLE
DOUBLE EXTENSION CAMERAS.

PATTERN No. 2.

FIVE PER CENT. DISCOUNT FOR CASH.



FIVE PER CENT. DISCOUNT FOR CASH.

THIS Camera is even more portable than pattern No. 1, and it is believed to be the SMALLEST and LIGHTEST Camera yet introduced. It can be supplied with either book form or the new solid pattern dark slides.

PRICES OF PATTERN No. 2.

SIZE.	With one Double Back.	With three Double Backs.	Turntable and Stand.	Brass Binding Camera and three Backs
6½×4¼	£5 10 0	£7 6 0	£1 17 6	£1 10 0
7½×5	6 0 0	7 16 0	1 17 6	1 10 0
8½×6½	7 0 0	9 5 0	1 17 6	1 15 0
10×8	8 10 0	11 8 0	2 0 0	2 0 0

NOTE.—Owing to differences in form of construction, and the small size and reduced cost of the new form of Double Backs, the prices of the No. 2 Pattern will compare favourably with any camera of the same class.

Extra Charge for Complete Aluminium Fittings, including Turntable.

6½×4¼, £2 15*s*. 7½×5, £3. 8½×6½, £3 10*s*. 10×8, £4.

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

STANDS.





Table Stand for the Studio, in oak, French polished	...	...	...	...	...	£1	10	0
,, ,, in white wood	...	...	...	...	...	1	4	0
,, ,, with rack adjustment	...	...	...	...	...	3	16	0
,, ,, in oak or mahogany	...	...	...	...	...	5	10	0
,, ,, large, in oak, rack adjustment				...	...	8	10	0
,, ,, with heavy triangular base	...	...	...	...	...	12	12	0
New Camera Tripod, rigid, light, and portable. A new folding stand, with attachments, obviating the necessity of any loose head or the use of a turntable. It is easily fitted, and by a simple arrangement allows of the Camera being turned when in position ...	...	...	...	...	...	1	17	6
The Lightning Tripod for Cameras up to Half-plate	...	...	...	...	...	1	1	0

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

Portable Camera Stands.



	£	s.	d.
Light Tripod Stands, for small Cameras ... ... from	0	12	6
Ash Tripod Stand, triangle top	1	1	0
,, (Kennett's pattern), small, medium, or large ...	1	6	0
,, threefold or fourfold...	1	5	0
,, with brass turntable	1	17	6
,, 8-in. brass triangle top, rigid legs	1	8	0
,, 8-in. ,, ,, stouter	1	10	6
,, 6-in. ,, ,, with jointed legs	1	4	0
,, 8-in. ,, ,, ,, ,, ...	1	12	0

FIVE PER CENT DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

ROSS' *NEW MODEL* Twin-Lens Camera.

(PATENT.)



THE great popularity of the Twin-Lens Camera, has created a demand for Cameras to take plates of larger sizes than those hitherto listed. To meet this want, and for the convenience of many lady Photographers and others who prefer to make a medinm-size picture, Ross, Ltd., have devised and patented a

NEW FOLDING . . . TWIN-LENS CAMERA

of even less weight, and which, when closed, is only two-thirds the size of the original model.

This important improvement has been achieved by discarding the hinged front door and portions of the top and and base of the body, and thus decreasing the weight, and utilising the front portions of the two sides to form folding doors (as shown in the illustration). The lower portion of the inside of these doors have grooved fittings, which form guides for the travelling frame, and thus renders this new form, when ready for use, absolutely rigid. When closed, the doors are fastened by a spring clip.

To set up the apparatus it is only necessary to press this spring and rack out the front, when the doors open automatically and the travelling frame runs into position. The front is then pulled forward and clamped by the curved lever.

This Camera is used in precisely the same manner as the original model, being suspended from the neck by a sling, or mounted upon a stand, as desired.

On the next page will be found the prices of both the original and new models, fitted with either Ross', Zeiss', or Goerz' Lenses.

When ordering, time and trouble will be saved if customers will kindly state clearly which pattern of Camera and series of Lens is required.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

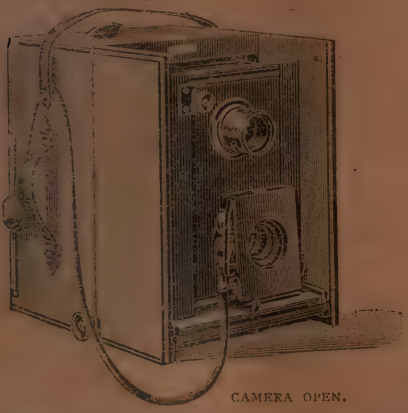
(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

ROSS' Portable Twin-Lens Camera.

Extensively Imitated but still Unequalled.

The following important advantages are claimed for this Camera :—



CAMERA OPEN.

1st.—Each picture can be obtained with microscopic sharpness.

2nd.—The composition and lighting of instantaneous pictures can be studied.

3rd. — In photographing yachts and other large subjects there is an absolute certainty of the whole of the objects being correctly centered, and contained within the limits of the plate.

4th—When used on an ordinary Camera on a Tripod Stand for obtaining portraits of children and animals, the many out-of-focus failures (due to the subject moving during the comparatively long interval that must elapse after focussing before the plate can be substituted for the screen) are by this system entirely avoided.

DIMENSIONS AND WEIGHTS OF ROSS' TWIN-LENS CAMERAS.

ORIGINAL RIGID MODEL.

For Plates.		Dimensions.	Weight.*
Inches.	c/m.	Inches.	
3¼ × 3¼	...	6½ × 4½ × 7½	2 lbs. 13 ozs.
4¼ × 3¼	6 × [illegible]	7 × 5½ × 7½	2 lbs. 15 ozs.
5 × 4	9 × 12	8 × 6½ × 8½	4 lbs. 5 ozs.
6½ × 4¾	12 × 16½	9½ × 8 × 9½	6 lbs.
7½ × 5	13 × 18	9½ × 9 × 9½	7 lbs. 4 ozs.
8½ × 6½	18 × 22	10½ × 10½ × 13	10 lbs. 8 ozs.

NEW PATENT FOLDING MODEL.

For Plates.		Dimensions.	Weight.*
Inches.	c/m.	Inches.	
4¼ × 3¼	6 × 8	5 × 5½ × 8	3 lb. 3 ozs.
5 × 4	9 × 12	6½ × 6½ × 9½	4 lbs. 8 ozs.
6½ × 4¾	12 × 16½	7 × 8½ × 10½	6 lbs. 3 ozs.
7½ × 5	13 × 18	7 × 9½ × 11	7 lbs. 8 ozs.
8½ × 6½	18 × 22	8½ × 10½ × 14½	11 lbs. 10 ozs.

* Without Lenses, Shutters, or other accessories, but including flanges and sling.

PRICES OF TW

Including Two Lenses accurately paired, Blind Shutter, and either T

WITH PAIR ROSS RAPID HAND CAMERA LENSES, F

For Plates.		Focus of Lenses.	Rigid Model.	Folding M
Inches.	c'm.	Inches.	£ s. d.	£ s.
3¼ + 3¼	...	4½	15 0 0	—
4¼ × 3¼	6 × 8	5	16 0 0	18 0
5 × 4	9 × 12	6	18 0 0	20 0
6½ × 4¾	12 × 16½	8	20 10 0	23 0
7½ × 5	13 × 18	9	—	27 0
8½ × 6½	18 × 22	12	—	35 0

WITH PAIR ROSS-ZEISS SERIES IIA ANASTIGMATIC LENSES, F8

			Rigid.	Foldi
Inches.	c'm.	Inches.	£ s. d.	£ s.
4¼ × 3¼	6 × 8	5½	19 10 0	21 10
5 × 4	9 × 12	6½	23 10 0	25 10
6½ × 4¾	12 × 16½	8	27 0 0	29 10
7½ × 5	13 × 18	8	—	32 0
8½ × 6½	18 × 22	9½	—	39 10

WITH PAIR ROSS-GOERZ SERIES III. DOUBLE ANASTIGMATIC LENSES, F7·7.

			Rigid.	Foldi
Inches.	c/m.	Inches.	£ s. d.	£ s.
4¼ × 3¼	6 × 8	5	20 10 0	22 10
5 × 4	9 × 12	6	23 10 0	25 10
6½ × 4¾	12 × 16½	7	26 0 0	28 10
7½ × 5	13 × 18	8¼	—	34 0
8½ × 6½	18 × 22	9½	—	42 0

FOR OTHER ACCESSORI

The above

ROSS, Limited, Opticians, 11

Works—CLAPH

LENS CAMERAS,

uble Dark Slides, or a Changing Box for 12 Glass Plates, or 20 Films.

WITH PAIR ROSS EXTRA-RAPID HAND CAMERA LENSES, F 5.6.

For Plates		Focus of Lenses.	Rigid Model.	Folding Model.
Inches.	c/m.	Inches.	£ s. d.	£ s. d.
3¼ × 3¼	...	4¼	17 0 0	—
4¼ × 3¼	6 × 8	6	19 0 0	21 0 0
5 × 4	9 × 12	7½	24 0 0	26 0 0
6½ × 4¾	12 × 16½	9	25 10 0	28 0 0
7½ × 5	13 × 18	10½	—	34 0 0
8½ × 6½	18 × 22	12	—	43 10 0

WITH PAIR ROSS-ZEISS SERIES IIIa. ANASTIGMATIC LENSES, F 8.

Inches.	c/m.	Inches.	Rigid. £ s. d.	Folding. £ s. d.
4¼ × 3¼	6 × 8	6	16 10 0	18 10 0
5 × 4	9 × 12	6¾	20 0 0	22 0 0
6½ × 4¾	12 × 16½	7¾	22 0 0	24 10 0
7½ × 5	13 × 18	7¾	—	26 10 0
8½ × 6½	18 × 22	9¼	—	34 0 0

Any other suitable Lenses or Shutters may be Substituted at the difference in Catalogue Prices.

EXTRA DOUBLE DARK SLIDES.

4¼ × 3¼ 15s. ... 5 × 4 18s. ... 6½ × 4¾ £1 2s. ... 8½ × 6½ £1 5s. each.

EXTRA CHANGING BOXES.

4¼ × 3¼	5 × 4	6½ × 4¾	8½ × 6½
£2 5s.	£2 12s.	£2 15s.	£3 5s.

INNER FRAMES.

Outside Sizes of Frames.

5 × 4	½-plate	7½ × 5	¼-plate
1s. 9d.	1s. 9d.	2s.	2s. 6d.

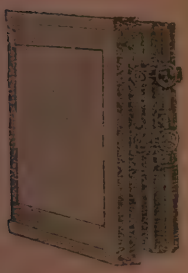
SEE NEXT PAGE.

re Net.

ew Bond Street, LONDON, W.

OMMON, S.W

ACCESSORIES TO ROSS' TWIN LENS CAMERAS.



DOUBLE SWING-BACK ATTACHMENT.

POLISHED BLACK.

For Cameras, $4\frac{1}{4} \times 3\frac{1}{4}$ ...	£1	5	0
,, 5×4 ...	1	10	0
,, $6\frac{1}{2} \times 4\frac{3}{4}$ ...	1	15	0
,, $7\frac{1}{2} \times 5$ ...	2	0	0



Double Swing-back attached to back of Camera.



Focussing Hood in position on Camera.

FOCUSSING HOODS,

— TO —

EXCLUDE SUNLIGHT FROM FINDER.

With Cups for Eyes ...	£0	9	6
Without Eyecups ...	0	6	6

Brass Binding Camera and Double Dark Slides.

Size ...	$4\frac{1}{4} \times 3\frac{1}{4}$	..	£1	0	0	Size ...	$6\frac{1}{2} \times 4\frac{3}{4}$	...	£1	10	0
,, ...	5×4	...	1	5	0	,, ...	$7\frac{1}{2} \times 5$	...	1	10	0

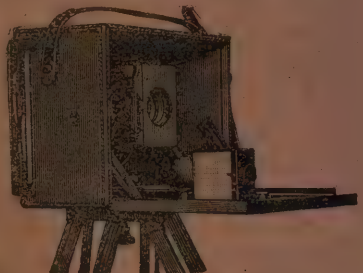
ALL THE ABOVE PRICES ARE FOR NET PROMPT CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET),
MANUFACTORY—CLAPHAM COMMON.

THE "BOND STREET" FOLDING CAMERA

FOR HAND OR STAND USE.

THIS Camera will specially commend itself to Travellers and Explorers on account of its great Portability and Efficiency. It is constructed in the same style as the popular 'Ross' Divided Camera,' only the best materials being used throughout. The exterior is covered with stout sewn leather, and the interior finished in a dead black, with bronze fittings. It is supplied with a sling to form a handle for carrying and to support the apparatus upon the chest when used as a Hand Camera. The back opening is fitted with a concealed full-size focussing screen, the front has horizontal and vertical sliding motions, and the focussing is effected by rack and pinion. The range of adjustment is sufficient for a long-focus lens, such as the Rapid Symmetrical, and the shortest focus wide-angle lenses can also be used. The reversing finder is made exactly to the scale of a quarter of an inch to the inch focus of lens, the tailboard folds up, and when closed conceals the lens and shutter, &c. This Camera is believed to be the most compact of its kind, the 6½×4¾ size measuring only 8½×4×6¾ inches when closed, and it presents the appearance of a neat black leather hand case. A divided scale for various distances and two bushes for tripod screw are fitted to each Camera. Dark slides for plates or cut films, roll-holders or changing boxes, may be used at will. The following prices include a Rapid Symmetrical Lens, a Thornton-Pickard Time and Instantaneous Shutter, and three black polished Dark Slides, or an Eastman Roll-holder. If a changing box is preferred, the cost will be a little higher.



— PRICES —

Size of Plate.	Outside dimensions.	Focus of Lens.	Price.	Double Swing Back extra.
5 × 4	7 ×3½×6 in.	7½ in.	£17 0 0	£1 12 6
6½ × 4¾	8½×4 ×6¾in.	9 in.	19 0 0	1 17 6
7½ × 5	× × in.	10½ in.	21 0 0	2 0 0
8½ × 6½	× × in.	12 in.	23 0 0	2 5 0

Any other suitable lens or shutter may be substituted at the difference in price.

A cheaper form of the above Camera can be supplied, and, though slightly more bulky and less highly finished, is nevertheless an excellent and reliable apparatus. Prices include Camera with Sliding Bellows, Swing Back and three Dark Slides, Fitted with Rapid Symmetrical Lens and Blind Shutter, all enclosed in neat leather case.

For Plates 4¼×3¼, £10. 5×4, £12.

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

The 'Filmerette' HAND CAMERA.



(PATENT.)

Takes 48 Cut Celluloid Films.

No Notching of Films.

THIS very compact Hand Camera is designed to take pictures on cut celluloid films, these being used just as received from the makers. The magazine is constructed to take 48 films, but any smaller number may be used when desired. They are packed in the magazine alternately with backing cards made of a specially tough material, which may be employed over and over again.

An automatic indicator is provided, showing at a glance how many exposures have been made.

The Camera is fitted with two good finders for horizontal and vertical pictures, and is also provided with an excellent Time and Instantaneous Shutter.

Either Ross', Zeiss', or Goerz' lenses of suitable focus may be used, the price of several of these being quoted below.



The Camera is provided for two bushes for attaching to a stand, either in the horizontal or vertical positions, when so desired.

PRICES.

For Plates.	Lens.	Focus.	£	s.	d.	Dimensions.
$4\frac{1}{4} \times 3\frac{1}{4}$ ...	Ross Hand-Camera Lens ...	$5\frac{1}{2}$ ins. ...	10	0	0	$9\frac{3}{4} \times 5\frac{1}{2} \times 6\frac{1}{2}$ inches. Weight, 4 lbs.
Do. ...	Series IIA, Zeiss ...	... $5\frac{1}{2}$,, ...	12	0	0	
Do. ...	Series III, Goerz ...	... 5 ,, ...	12	0	0	

The above Prices are net.

Instructions for using the 'Ross' Film Camera.

To Load the Camera, place the plates or films alternately with the backing pieces in the magazine, replace the spring-board, and close door of magazine. Set the indicator at '0,' and leaning the magazine a little forward by sliding the milled head, close the door of camera. Draw the magazine up to the vertical position, and the indicator will change to '1,' showing the first film is then in position for exposure.

To Set the Shutter ready to make an exposure, pull out the setting rod by the small knob which projects through the side of the camera, and release.

To Adjust Rapidity of the Shutter, set the lever in the slot at top of camera, so that the mark thereon is opposite the figures indicating the desired speed.

To make the Exposure, press down the end of the trigger which projects just above the setting rod.

To make a Time Exposure, screw in up to its shoulder the time stop on the front of the camera near the lens, draw out the setting rod as far as it will come, and allow it to return just as when setting the shutter. This movement will open the lens aperture, and it can be closed by pressure on the trigger when the exposure is complete. Be certain to screw the time spot out to its original position before attempting to set the shutter for instantaneous exposures. Time exposures may also be made by setting the shutter at slow speed and releasing as for instantaneous work; but instead of allowing the finger to rest on the trigger, remove it immediately. The shutter will open and remain so until closed by a second depression of the trigger.

To Change the Plates or Films, hold the camera firmly, give the milled head on side half a turn to the left, keep it in that position and slide it forward to the end of the slot. When quite at the end of the slot, pull the head out as far as it will come, and, after a pause, push it back again; draw the milled head back to its original position and clamp it there by turning to the right. This operation, which should be performed without letting go the milled head until the movement is complete, releases the plate or film last exposed, deposits it in the chamber at the bottom of the camera, and registers the consecutive number of the foremost plate in the magazine.

To Remove the Exposed Plates or Films, open the sliding door in the bottom of the camera.

The camera being made to carry the standard quarter-plate size ($4\frac{1}{4} \times 3\frac{1}{4}$), films of irregular sizes and shapes must on no account be used.

Before opening or closing the back door of camera, the magazine should be turned forward that it may clear the indicator.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

Works—CLAPHAM COMMON, S.W.

THE WEIR-ROSS FILM CAMERA.

For Tourists. For Cyclists.

AN IDEAL LADIES' CAMERA.

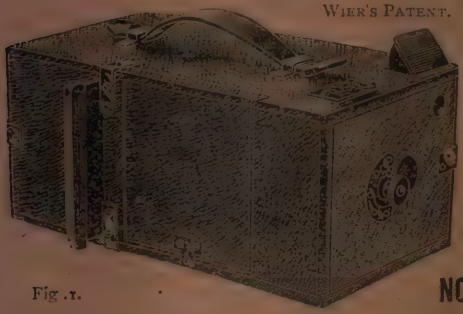


Fig. 1.

PORTABLE, LIGHT & SIMPLE.

Takes 24 Cut Celluloid Films.

NO NOTCHING, NO BACKING CARDS.

No.	For 24 Films.	Outside Dimensions. Inches.	Weight.	Focus of Lens.	Prices with Safety Blind Shutter.
1	$3\frac{1}{4} \times 3\frac{1}{4}$	9 × 5 × 4	$2\frac{3}{4}$ lbs.	5 in.	£7 7 0
2	$4\frac{1}{4} \times 3\frac{1}{4}$	10 × 5 × 5	$3\frac{1}{4}$,,	6 in.	£8 8 0

The above prices include a set of 24 Steel Clips for attachment to Films and one Clip Fixer.

Leather Case with sling, or Bicycle Attachments—

No. 1 ... ... 10s. 6d.
No. 2 ... ... 15s. 0d.

Light Tripod Stands, 10s. 6d. to 25s., according to material and quality.
Extra Film Clips, 1s. per dozen.

FIVE PER CENT. DISCOUNT FOR CASH.

DESCRIPTIVE HANDBOOK POST FREE.

Cut Films by all Leading Makers promptly supplied.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

Cyclist Photographic Outfits.

One frequently hears a Cyclist remark with regret, "I have been passing through some lovely scenery, I wished I had a camera with me." Well, why not?

It can be done with ease and comfort.

Do not look back upon your cycle outings as lost opportunities, but carry a Camera and bring back souvenirs of your journeys for your own subsequent pleasure and for the benefit of your friends.

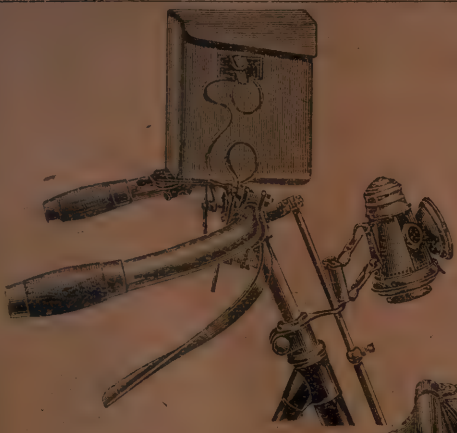


Fig. 1.

A Compact Photographic Outfit may be very conveniently carried in a light Leather or Canvas Case attached to the Cycle as in Figs. 1 and 2.



Fig. 2.



Fig. 3.

Small Hand Cameras or Field Glasses.

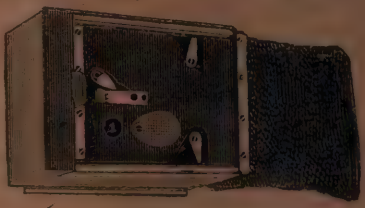
can also be carried with comfort suspended by a sling from the shoulders as in Fig. 3.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

A New Plate or Film CHANGING BOX.

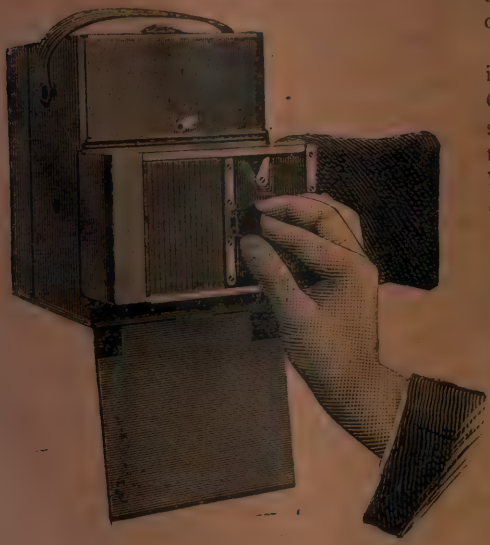
(Grundmann's Patent.)

THIS Patent CHANGING BOX serves both as a magazine and dark slide, no extra slide being necessary.



It is capable of holding twelve dry plates or twenty cut films at one time, and all the exposures may be made in turn without refilling the Changing Box.

It will work equally well with either the full complement, or with any lesser number, down to a single dry plate or film.



The characteristic feature of this Changing Box is the shutter, which takes the form of a roller-blind, and when opened, follows a semi-circular course round and into the body of the box.

The opening and closing of the Changing Box, and the exposure of a plate or film, is effected by each movement of the shutter forwards and backwards

CHANGING BOX. (GRUNDMANN'S PATENT.)

SPECIAL ADVANTAGES:

The absence of all brittle or delicate springs, screws, rackwork, &c., liable to be damaged or to get out of working order

The dispensing with any Protruding Shutter, so much in the way in working with other Changing Boxes.

Its Light Weight, which is much less than that of any other Changing Box.

Its Compactness. The size of this Changing Box, which has capacity for twelve dry plates, or up to twenty films, is about equal to that of three ordinary double dark slides.

Its Cheapness. The cost is not greater than that of three well-made double dark slides.

PRICES.

CHANGING BOXES, provided with an arrangement for widening or narrowing the slots through which the carriers pass, adapting them to work with 12 Dry Plates or 20 Films. Well-seasoned mahogany, brass bound.

Inches...	$4 \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$	Stereoscopic.
Price ...	£2 5 0	£2 12 0	£2 15 0	£3 5 0	£2 10 0

FOR 6 PLATES OR 10 FILMS—

Inches... ...	$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$
Price	£1 15 0	£2 0 0	£2 5 0	£2 15 0

They can be fitted with any ordinary Bellows Camera and to most Hand Cameras.

THIN EXTRA CAMERAS FOR FILMS ONLY—

Inches	$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$	Stereoscopic.
Cardboard, each...	4*d.*	6*d.*	8*d.*	10*d.*	6*d.*
Aluminium ,, ...	1/3	1/6	2/-	—	2/-

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

MANUFACTORY—CLAPHAM COMMON.

Sole Manufacturing Licensees for the British Empire.

The Folding 'Montauk.'



AMERICA'S IDEAL HAND CAMERA.

An exceedingly compact, light, and strongly-made Hand Camera, having all modern improvements, which, being made from the finest material by the most skilled workmen, even to the leather work—by far handsomer than any of similar construction—it may be looked upon as the *beau ideal*.

The new pattern 'XTRALITE' double dark slides, by ½ in. smaller than the ordinary, are fitted to the Folding Montauk.

PRICES, including One Double Dark Slide:—

No. 1 PATTERN. DOUBLE EXTENSION.		No. 2 PATTERN. SINGLE EXTENSION.	
5 × 4	£4 4 0	5 × 4	£3 15 0
7 × 5	5 5 0	7 × 5	4 15 0

Can be fitted with nearly any Lens or Shutter.

EXTRAS.—If Cameras are desired so constructed as to allow of three Holders being carried therein, instead of one, the extra charge, including Holders, is:—

5 × 4 ... ... £0 17 6 | 7 × 5 ... ... £1 2 6

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET.)

MANUFACTORY—CLAPHAM COMMON.

The 'INFALLIBLE' HAND CAMERA.

McKellen's Patent.



Highly Recommended.

THIS is an excellent Magazine Camera well deserving its name. It measures approximately $9\frac{1}{2} \times 5 \times 6$ inches, and is very unobtrusive in appearance. Internally the apparatus is fitted with McKellen's Infallible Automatic Mechanism. The magazine is made to carry 12 plates in sheaths, or 24 films in sheaths may be used if desired. Any number of plates may be omitted altogether, or their places filled with twice the number of films, for instance, six sheaths with plates and twelve sheaths with films may be used *without any alteration of the mechanism.*

The changing of plates is effected by means of a very ingenious and yet extremely simple and reliable contrivance, actuated by a key, and nothing is left to chance. The operator who could make a mistake in this would be just as likely to omit putting his plates in the sheaths when charging the camera.

Any lens of suitable focus may be employed, and a variety of shutters may also be adapted without trouble. Two Finders are provided, one for vertical and the other for horizontal pictures.

Camera as above described, to carry 12 glass plates or 24 films in sheaths, size $4\frac{1}{4} \times 3\frac{1}{4}$, with two Finders, but no Lens or Shutter ... ... } £10 0 0
Rapid Symmetrical Lens, *f*8, 5 in. focus ... ... }
Aluminium Shutter (Time and Instantaneous) ... ... }

FIVE PER CENT. DISCOUNT FOR CASH.

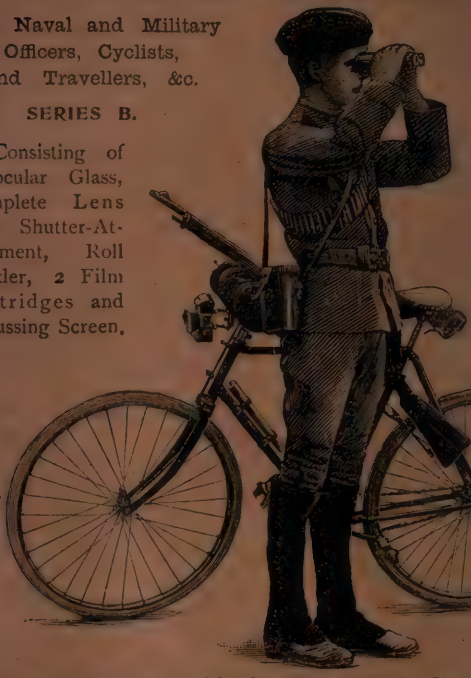
ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

THE PHOTOSCOPE.

For Naval and Military Officers, Cyclists, and Travellers, &c.

SERIES B.

Consisting of Binocular Glass, Complete Lens and Shutter-Attachment, Roll Holder, 2 Film Cartridges and Focussing Screen.



Is the only camera that has more than one function, it is a Field or Marine Glass, which when fitted with the patent appliances, will photograph the object seen through it.

Can be supplied in one Leather Sling Case, or the Binocular Glass may be carried in its own original case and the photographic attachment and accessories fitted into another similar case.

	Brass.	Aluminium
Best Quality 12 Lens Military Binocular	£5 0 0	£9 0 0
Photo Attachments and Case	4 10 0	6 0 0
Complete	**£10 10 0**	**£15 0 0**
Second Quality 6 Lens Military Binocular	£3 10 0	£5 5 0
Photo Attachments and Case	4 10 0	6 0 0
Complete	**£8 0 0**	**£11 5 0**

Photo Attachments if adapted to customer's own Binoculars, 5s. extra, to cover cost of adaptation. Five per Cent. Discount for Cash.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

CAMERA CASES.

	4½×3½	6½×4¾	7½×5	8½×6½	10×8	12×10
Waterproof Sling Canvas Cases, limp	£0 6 0...0	8 6...0	10 0...0	11 0...0	14 0...0	17 6
Best quality Canvas, stiff	0 15 0...1	0 0...1	1 0...1	3 6...1	5 6...1	10 0
Solid Leather, with lock	1 6 0...1	17 6...2	2 0...2	4 0...2	10 0...3	10 0

FOCUSSING CLOTHS.

Velvet, 5/- ; Fine Rubber, 5/- up to ½-plate ; larger, 8/6.

EXTRA DOUBLE SLIDES FOR DRY PLATE CAMERAS.

Size.	New Form.	Ordinary. Price.	Highest Finish.	Brass Binding.
4½×3½	—	£0 13 6	£0 15 0	£0 4 0 extra.
5 ×4	—	0 16 6	0 18 0	0 4 0 ,,
6½×4¾	£0 18 0	1 0 0	1 2 0	0 4 0 ,,
7½×5	0 18 0	1 0 0	1 2 0	0 4 0 ,,
8½×6½	1 1 0	1 2 6	1 5 0	0 4 6 ,,
10 ×8	1 6 0	1 9 0	1 12 0	0 5 0 ,,
12 ×10	—	1 16 0	2 0 0	0 5 6 ,,
15 ×12	—	2 9 6	2 15 0	0 6 0 ,,
18 ×16	—	3 0 0	3 10 0	0 7 6 ,,

THE FRAM PATENT FILM SLIDES.

PRICES—SINGLE OR DOUBLE.

¼-plate...£0 17 0 | 5×4...£0 19 6 | ½-plate...£1 2 0

INNER FRAMES.

Outside sizes of Frames.

5×4	½-plate	7½×5	¼-plate	10×8	12×10	15×12	18×16
1/9	1/9	2/-	2/6	3/-	3/6	5/-	6/-

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

ROSS'

CHEMICAL CASES.



No. 1 Portable Case (not figured), about 12×5×6 inches, fitted with Stoppered Bottles containing sufficient Chemicals and Solutions for the manipulation of about

12 dozen 4¼×3¼ or 5×4 Dry Plates.
8 „ 7½×4½ or 6 dozen 8×5
4 „ 8½×6½ or 3 „ 10×8

And three Glass Measures ... £1 1 0

ESTIMATE No. 12. No. 13. No. 14.

No. 2 Portable Case. No. 3 Ditto. No. 4 Ditto.

Developing Case, as illustrated above, fitted with Stoppered Bottles containing sufficient Chemicals for the manipulation of

	12 Doz. 5 by 4 Plates.	8 Doz. 6½×4¼ Plates.	6 Doz. 8½×6½ Plates.
	£1 2 3	£1 4 1	£1 10 8
Portable Lamp	0 4 6	0 4 6	0 7 6
Scales and Weights	—	0 5 6	0 5 6
Three Glass Measures	0 2 7	0 2 7	0 2 7
Porcelain Dish, deep	0 1 0	0 1 6	0 2 0
„ shallow	0 0 9	0 1 0	0 1 6
Compo. Dish	0 1 5	0 1 10	0 3 0
Varnish	0 1 0	0 1 0	0 2 0
Brush	—	—	0 1 6
Tin to contain Paper	0 1 6	0 1 9	0 2 6
Glass Cloth	—	0 0 6	0 0 6
	£1 15 0	£2 4 3	£2 19 3
Two Printing Frames	0 5 0	0 6 0	0 8 0
One Tube Gold Chloride	0 2 0	0 2 0	0 2 0
Acetate of Soda	0 0 6	0 0 6	0 0 6
	£2 2 6	£2 12 9	£3 9 9

ESTIMATE No. 15.

PRINTING REQUISITES.

One quire Sensitized Paper	£0 15 0
Tin for ditto	0 1 6
Two Tubes Chloride of Gold	0 4 0
3 ozs. Acetate Soda and Bottle	0 0 6
	£1 1 0

SUFFICIENT FOR ABOUT

2½ gross 5 ×4 2 gross 6½×4¼
1½ „ 7½×5 1 „ 8½×6½
Or ¾ gross 10×8 Prints.

FIVE PER CENT. DISCOUNT FOR CASH.

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(Corner of Brook Street).
MANUFACTORY—CLAPHAM COMMON.

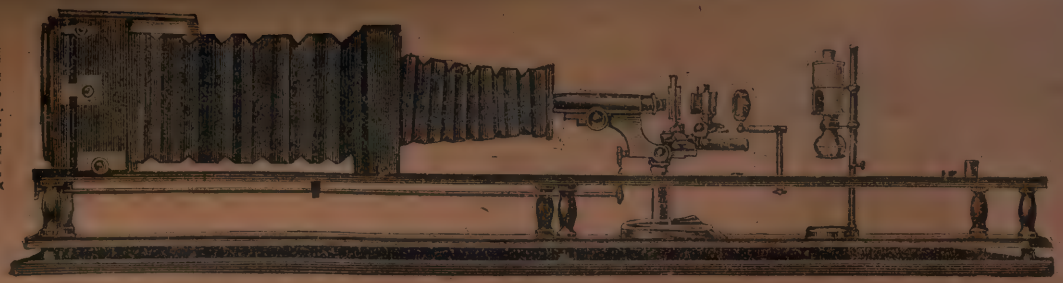


PHOTO-MICROGRAPHIC CAMERAS.

THESE Cameras are of the most substantial construction, and yet capable of the most delicate adjustment. The superstructure is fixed on a solid mahogany baseboard. The top board on which the camera runs is so arranged that the Microscope, Camera, Condenser, Lamp, &c., are all central with each other, and the whole can be adjusted for work both quickly and accurately.

The following prices include Baseboard, Camera, with one dark slide, and fine adjustment rod. Microscopes and other optical parts can be supplied at the catalogue prices, or customers' own Apparatus may be used, a small charge being made for adaptation of same.

Size of Camera.	Length of Baseboard.	Extension of bellows, including cone.	Price, exclusive of any necessary adapting.
$4\frac{1}{4} \times 3\frac{1}{4}$	48 inches.	18 inches.	£11 0 0
$6\frac{1}{2} \times 4\frac{1}{4}$	60 ,,	30 ,,	13 0 0
$8\frac{1}{2} \times 6\frac{1}{2}$	70 ,,	36 ,,	15 0 0
10 × 8	80 ,,	44 ,,	18 0 0
12 × 10	90 ,,	54 ,,	21 0 0

A cheap conical-shaped mahogany Camera for attachment to tube of Microscope can be supplied for 50/-, including one $4\frac{1}{4} \times 3\frac{1}{4}$ single dark slide.

FIVE PER CENT DISCOUNT FOR CASH.

ROSS'

NEW PATENT SCIENCE LANTERN.

Designed for the use of Universities, Colleges, Schools, and all Institutions, &c., requiring a Science Projection Lantern of the very highest class.

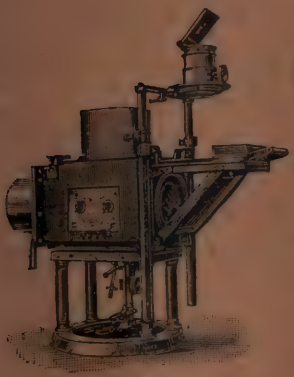


Fig. 1.

Fig. 1.

ROSS'

New Patent Science Lantern.

(As arranged for use vertically, or for parallel beam work, &c.)

Complete change from Horizontal to Vertical and *vice versâ* occupies about three seconds.
Great comfort and ease of movement when used for drawing diagrams, &c.
The Mirrors are of special character, and project clearly defined lines, &c., on the screen.
The other front (seen on the left of the illustration) is for parallel beam work, &c., can be brought round into position without in any way interfering with the position of the vertical arrangement, which can in its turn be brought round again when required.
Stage plate of aluminium instantly removable for cleaning, &c.

ROSS, Ltd., have much pleasure in inviting the attention of all those interested in Scientific Demonstration Work to a high-class instrument which they have lately designed for that purpose.

It will be found that the conveniences and requirements necessary for all classes of work have been most carefully studied and provided for in the simplest possible manner, consistent with the most perfect efficiency; nothing has been omitted that is useful, and it is as efficient and as comprehensive in all respects as the most perfect instruments yet devised, and in some of its actions far surpasses them.

When in use it works with the greatest accuracy and precision, while its rectangular form and general simplicity of construction allows of its being produced at a very moderate price for so complete an apparatus.

The body of the instrument is built on a large and deep ring, working in a frame which is mounted on four stout pillars fixed to a circular base.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(Corner of Brook Street).
MANUFACTORY—CLAPHAM COMMON.

Fig. 2.

Ross' New Patent Science Lantern.

As arranged for ordinary projection and for parallel beam work, &c.)

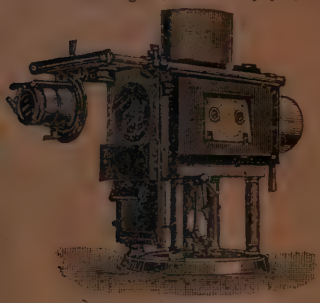


FIG. 2.

The large tubes afford a very long range, combined with the utmost stability when it is desired to project apparatus.

Complete absence of the usual stage springs, yet everything is held securely, but detached instantaneously, the doors of aluminium keeping their position by gravity alone, without catches or fastenings of any kind. The jet (either 'blow-through' or 'mixed') has all adjustments, and the change of position as regards the distance from condenser being so frequent in science work, the control of this important motion is most conveniently managed by the ball-headed lever handles seen at each side of the frame resting on the pillars.

The ventilation is most perfect.

The instrument, it will be noted, is double fronted, and each end or front carries a triple condenser of improved form. One of the fronts takes slides, tanks, diagrams, &c., and a leading feature of this part of the instrument is the framed mirror, which is pivoted towards the lower portion of the stage, then, when the large handle seen across the front is grasped, the stage can be raised into a horizontal position, the large mirror engages with two catches, and the smaller mirror lying along the objective being brought into position against its stop, an absolutely perfect vertical arrangement is at once obtained; this is certainly the most perfect form of vertical arrangement ever devised, as it is certain in action, almost instantaneous in adjustment, has no loose parts, and dispenses with the necessity of a separate objective and condenser. These advantages alone affect very considerably the cost of production, while it is, in addition, most luxurious in its comfort to the demonstrator.

The other front is for parallel beam work, &c., the handle, seen projecting downwards from the large tube fitting, is laid hold of, and the body of the instrument swung round until this end or front is central with the light, the light itself remaining stationary; into this front can also be inserted a Wright's optical front, slit front, microscope, polariscope, &c., and the various sections of the condenser are instantly removable for various classes of work.

It can be supplied either in metal throughout or partly in wood; at present it is only offered as adapted for Limelight, but a larger size is contemplated for use with Electric Arc Light.

It is fairly portable, and occupies but little space.

Price, complete with Objective, Jet, and all movements as described (in metal throughout, or in metal with walnut or mahogany slides), **£42.**

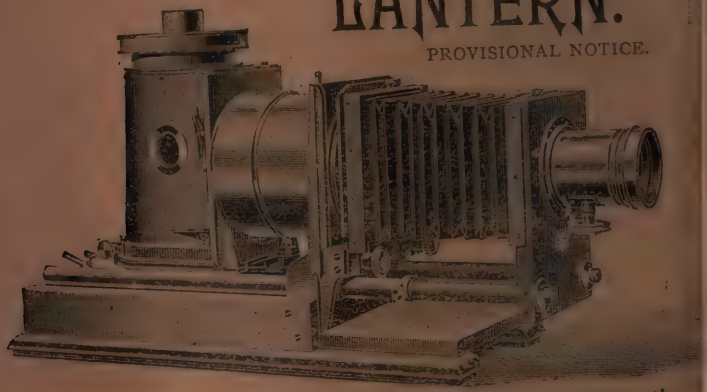
FIVE PER CENT. DISCOUNT FOR CASH.

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(CORNER OF BROOK STREET).
MANUFACTORY—CLAPHAM COMMON.

ROSS'

NEW MODEL 'ECLIPSE' LANTERN.

PROVISIONAL NOTICE.



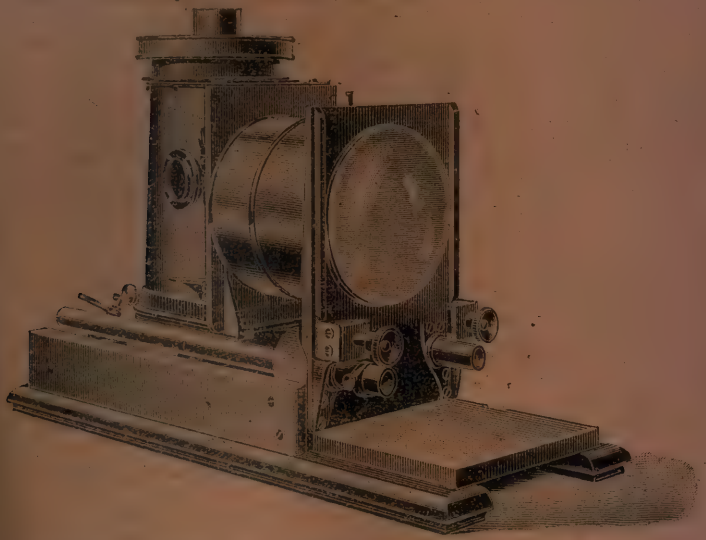
THIS novel form of Lantern has been designed to answer the threefold purpose of Ordinary Projection, Enlarging, and Scientific Demonstration. Unlike some other instruments of the 'Universal' type, it is not made up of a series of compromises doing only one thing perfectly, but it accomplishes its work in each department with ease and perfection. A special feature of the Lantern is that it carries two Condensers—viz., a 5½ in. Double and a 4½ in. Triple—either of which can be used and exchanged for the other when desired with great facility. The 5½ in. Condenser is used for Projecting transparencies of either the ordinary Lantern or ¼-plate sizes, or for enlarging from a ¼-plate negative, and may also be used to enlarge portions of larger negatives.

It is also admirably adapted for Science work, as the light can be made to throw either convergent or divergent beams at will; and by separating the Condenser and using only one half of it, other purposes may be served—such as the illumination of tableaux, &c.

The Triple Condenser is used where it is important to obtain the maximum light for the projection of slides of the standard size.

Another important feature of the Lantern is the novel and comparatively small body or head enclosing the illuminant and carrying the chimney. This is fitted with sight holes, but no doors. The metal body can, by a patent arrangement, be raised several inches from its base, disclosing that portion of the jet which carries the lamp, and leaving it entirely free for fixing. When this is done, the body can with equal facility be lowered into its original position. The jet taps and lime turner are placed outside this rising body, and the ventilation of the instrument is very thorough, both the direct and radiated heat being carried off thoroughly, no part of the apparatus being liable to undue heating.

The stage is entirely open on three sides, the bellows can be detached in a moment, or the whole front can be entirely removed with ease. Although the instrument carries a Condenser of such large size, its dimensions are in some respects well within the limits of other Lanterns carrying only the 4 in. Condenser, and this result is obtained by the use of metal in the construction of all the working parts, only the front and base being of wood. The apparatus is not, therefore, liable to get out of order, there being no woodwork used where it could become warped with the heat.



Any form of limelight can be employed, but arrangements are being made to fit the instrument with a new form of jet which will require only one cylinder of gas, giving a light fully equal to the best mixed jets. The Lantern can also be fitted with a suitable Electric Arc Lamp.

For vertical projection a very convenient attachment has been designed, which can be fitted to the apparatus without trouble.

PROVISIONAL PRICES.

Complete with two Condensers, finest Objective, best quality Jet, Vertical Attachment, and strong Wooden Case with lock and key	£21	0	0
If with ordinary Objective and Jet, without Vertical Attachment ...	15	0	0

FIVE PER CENT DISCOUNT FOR CASH.

FOR FULLER PARTICULARS SEE COMPLETE CATALOGUE.

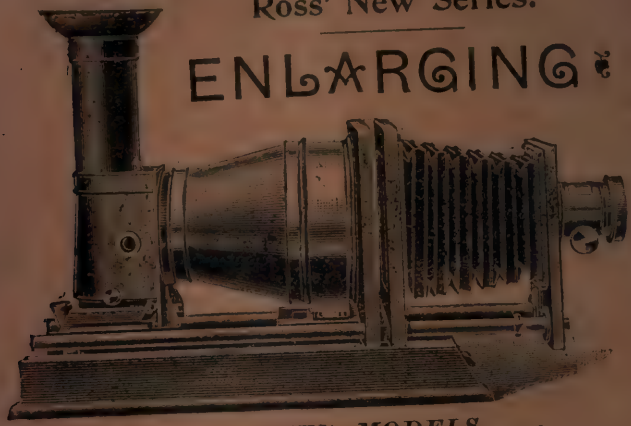
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(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

Ross' New Series.

ENLARGING LANTERNS



. . IMPROVED MODELS. . .

THIS Apparatus, whilst bearing a general resemblance to other instruments for the same purpose, differs from them in every essential detail both optically and mechanically. The base is designed to give the utmost freedom of movement to and fro on any flat surface.

An Oil Lamp, giving a flame of great actinic power, is supplied with the instrument, but either an incandescent Gas Lamp, or a Lime-light Jet, suited to the apparatus, can be supplied at a small additional cost, and will fit without any alteration, or any other additional parts whatever.

Where gas is available the Incandescent Lamp is recommended. The Bellows can be readily detached, and the apparatus can then be used for many purposes of scientific projection.

Diam. of Condenser	5½ ins.	6 ins.	8 ins.	11 ins.	13 ins.	16 ins.
Fully Covers [inches]	4¼ × 3¼	5 × 4	6½ × 4¾	8½ × 6½	10 × 8	12 × 10
PRICE (without Objective)	£6 10 0	£7 10 0	£9 10 0	£20 0 0	£40 0 0	£80 0 0

FIVE PER CENT. DISCOUNT FOR CASH.

FOR FULL PARTICULARS SEE COMPLETE CATALOGUE.

ROSS, Limited, Opticians, 111 New Bond Street, London, W.

(CORNER OF BROOK STREET).

MANUFACTORY—CLAPHAM COMMON.

. . THE . .

ROSS-HEPWORTH

ARC-LAMP

FOR PROJECTION LANTERNS.

SIMPLE,
SAFE,
SATISFACTORY.



FOR EITHER DIRECT OR ALTERNATING CURRENTS.

Full Particulars Post Free.

On Solid Base, as illustrated ... ... £5 5s.
A Cheaper Form, to fit on lime pin ... ... £3 3s.

CARBONS (Price per Half-dozen Pairs):

1. For Continuous Current, 5 to 10 ampères ... ... 1s. 0d.
   (7 mm. solid and 10 mm. cored).
2. For Continuous Current, 10 to 15 ampères 1 6
   (10 mm. solid and 13 mm. cored).
3. For Alternating Current, 5 to 10 ampères 1 3
   (10 mm. cored).
4. For Alternating Current, 10 to 15 ampères 1 9
   (13 mm. cored).

ROSS, Ltd., Opticians, 111 New Bond Street, LONDON, W.
(CORNER OF BROOK STREET),
MANUFACTORY — CLAPHAM COMMON.

NOTICE.

ROSS' Complete New Catalogue will be sent to any part of the world on application.

SECTION I.

Contains full Particulars and Prices of

Ross' Photographic Lenses and Shutters.
Ross' Field, Studio, and Process Cameras.
Ross' New Hand Cameras.
Ross' Photographic Apparatus of every kind.
Ross' Science, Projection, and Enlarging Lanterns.

ETC., ETC.

SECTION II.

Contains full Particulars and Prices of

Ross' Microscopes and Objectives.
Ross' Sporting and Naval Telescopes.
Ross' Field, Marine, and Opera Glasses.
Ross' Barometers, Thermometers, &c,
Ross' Spectacles and Eyeglasses, &c. &c.

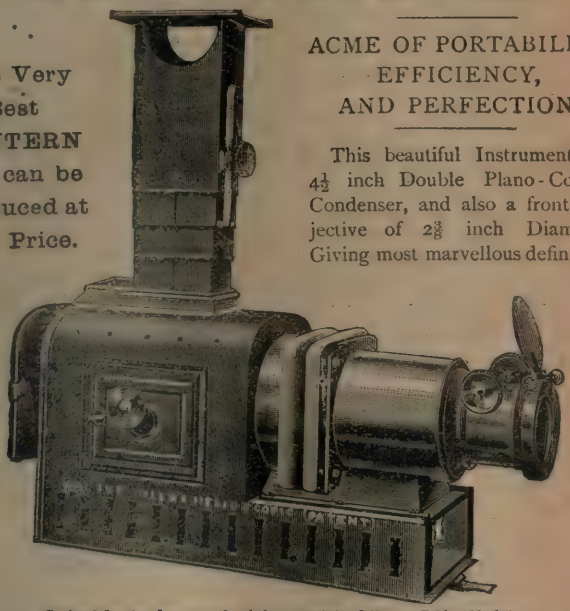
ROSS, Limited, Opticians, 111 New Bond Street, London, W.
(CORNER OF BROOK STREET).
Factory—Clapham Common.

[*See preceding pages.*

WALTER TYLER'S New Improved
PATENT HELIOSCOPIC LANTERN.

The Best Lantern the World can Produce.

The Very Best LANTERN that can be Produced at any Price.



ACME OF PORTABILITY, EFFICIENCY, AND PERFECTION.

This beautiful Instrument has 4½ inch Double Plano-Convex Condenser, and also a front Objective of 2⅝ inch Diameter. Giving most marvellous definition.

Suitable to be used either with Oil or Limelight.

The popularity and consequent sale of this Lantern is so great that I have at a very considerable increase in the production made important improvements and additions, which, without doubt places the 'HELIOSCOPIC' as the best Lantern in the World. Can be used for Exhibiting in the smallest Drawing Room or largest Lecture Hall.

THE PRICE REMAINS THE SAME, £4 4s.

N.B.—**WALTER TYLER** is prepared to compete the 'HELIOSCOPIC' with any Lantern on the market, and will send it on approval, and if found not to be as stated, the amount deposited will be refunded in FULL.

THE SECRET OF SUCCESS.

'A new invention is brought before the public, and commands success. A score of ABOMINABLE IMITATIONS are immediately introduced by the unscrupulous, who, in copying the original closely enough to deceive the public, and yet not so exactly as to infringe upon legal rights, exercise an ingenuity that, employed in an original channel, could not fail to secure reputation and profit.'—ADAMS.

Between Waterloo Railway Station and Waterloo Bridge.

HIRE OF SLIDES, *Best Quality.*

• • • •

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For Complete Set or Sets to a total of 50 Slides... ... ... 3s. 0d.

Any number above 50 Slides ... ...per dozen, 0s. 8d.

Selections from various Sets, including Comic Slips and Chromatropes, &c. ... ...per dozen, 1s. 0d.

Or by paying a SUBSCRIPTION any Slides can be had on Hire

450 for ... ... ONE GUINEA

1000 „ ... ... TWO GUINEAS

1600 „ ... ... THREE GUINEAS.

At such times and in quantities as to suit the requirements of customers. If the number be not used during a season, the subscription terms hold good until the number of Slides are had on hire. No extra charge made for coloured sets.

WALTER TYLER is most anxious to meet the requirements of all his customers, who can make selections from various sets; but it must be clearly understood that if this is done the whole of the hire must be calculated at the rate of 1*s.* per dozen, except to subscription customers.

Lantern Slide Materials.

Lantern Slides can be made from customer's own Negatives at 1*s.* each or 10*s.* per dozen. Colouring Slides in Oil Colours, 6*d.* each.

Slides prepared from Photographs, Engravings, Hymns, &c. First Slides, 2*s.* each; after Slides, 1*s.* each; or if one dozen are sent to copy, 1*s.* 6*d.* each, after Slides, 10*d.* each.

Lantern Masks, best quality, black both sides, cushion, dome or circles, in box, 150 for 10*d.*

(These can be had assorted, no extra charge.)

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If you desire to purchase, hire, or exchange Lanterns and Slides, you cannot do better than call or send to WALTER TYLER, who makes this business a *spécialité*, and supplies all articles better and cheaper than any house in the trade. Large stock of Second-hand Lanterns and Slides, great bargains.

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WALTER TYLER'S CATALOGUE.

The Helioscopic Lantern, new pattern, is the very best Lantern for giving perfect definition and extraordinary power of light. Several hundreds sold last season, and testimonials received from all parts of the world.

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Price of Slides 1/- *each Plain and* 1/6 *Coloured, or can be had on hire at the usual terms.*

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Or, Scenes from the Life of Christ.

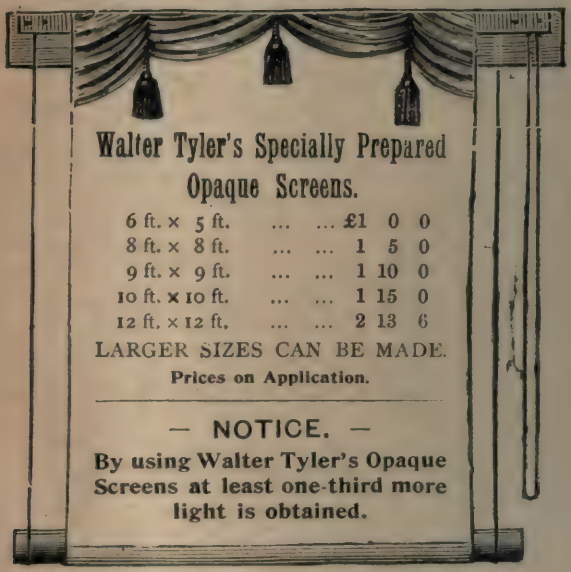
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IN presenting the Life of Jesus Christ by means of reproduction from the canvases of some of the greatest masters of the art of painting, it will be well to bear in mind some of its most striking and unique characteristics. No person in the world, and for the moment we are thinking of Jesus of Nazareth as a character of history, has so largely entered into the thought, been so often upon the lips, and so supremely touched the hearts of men as that of Jesus Christ. No life has been the subject of so much disputation and analysis, or been more widely read and perseveringly written about. Yet what are its details, and how have they been preserved to us? What is it that has made the name of Jesus such a power in the world? The secret surely is to be found in the beautiful picture which introduces to us the subject of the lecture, 'The Light of the World.'

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Can be fixed to any wall, beam, window, roof, &c.

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These Opaque Screens are not the common paper-faced articles usually sold, but are especially prepared, and are only manufactured for Walter Tyler; every particle of light is kept on the surface of the Screen, and are, in every respect, most satisfactory.

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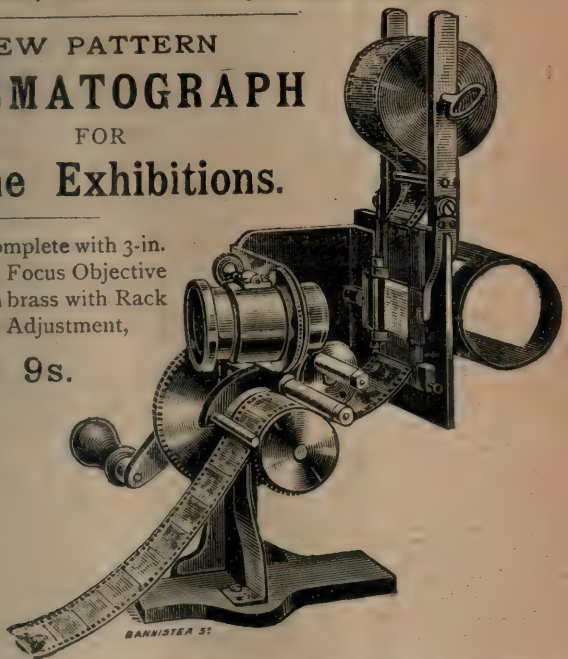
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Prices for Cubic foot in our Cylinders ...	3d.	2½d.	2d.
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No Hire Charge will be made for use of Cylinders the first Fourteen Days, but 1s. per week will be charged after that period for any size Cylinder. Prices and trade terms for purchase of Cylinders, &c., &c., on application.

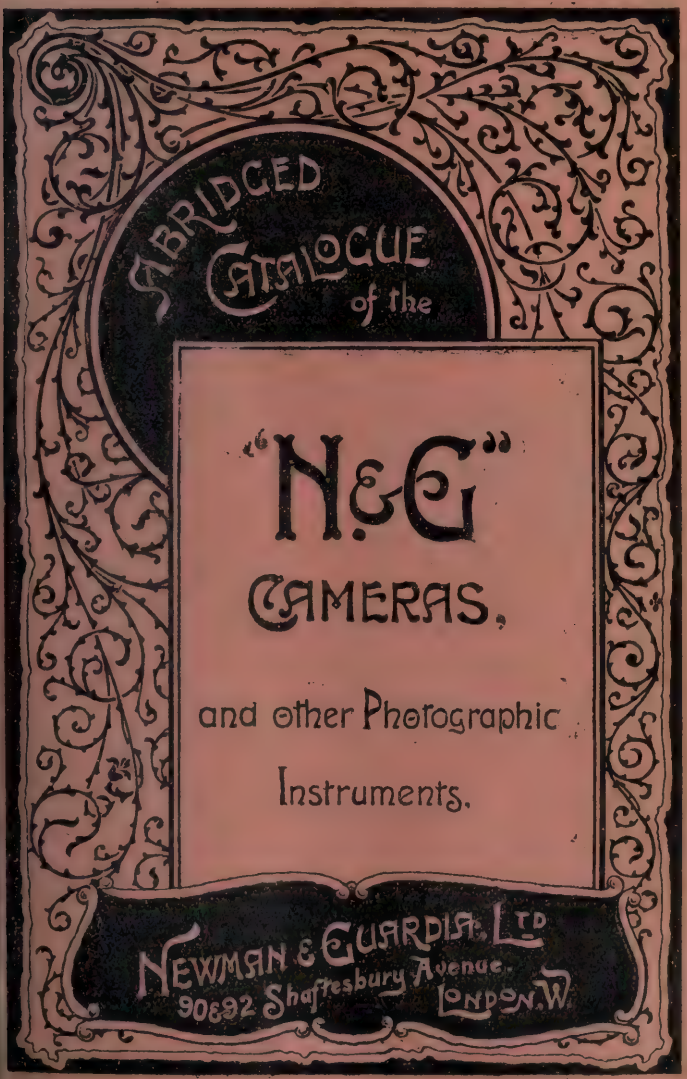
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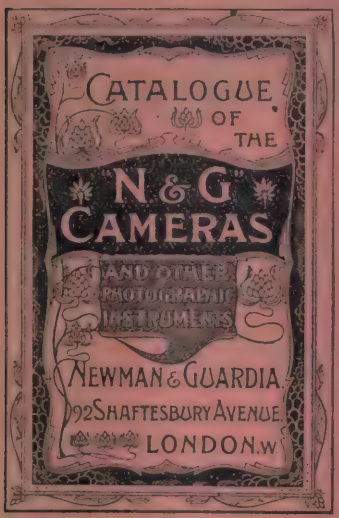
☛ 'A Lesson to Picture Makers.'

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OF THE

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FULL INSTRUCTIONS for WORKING the 'N. & G.' Instruments.

ONE HUNDRED AND TWELVE ILLUSTRATIONS, including Sixty 'Swantype' Reproductions from Original Negatives by leading workers.

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IT is not possible within the limits of this advertisement to adequately describe and illustrate instruments like the 'N. & G.' Cameras. The information here given, however, is quite up to date, and will be found sufficient to enable customers to place their orders for 1898.

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Unless otherwise ordered, Foreign orders are sent by Parcel Post if possible; if too heavy for the post, by first steamer, and packed in *tin-lined* cases.

All goods are packed with the utmost care, and we cannot hold ourselves answerable for any damage they may sustain in transit.

DEPOSIT ACCOUNTS.—For the convenience of Customers residing or travelling in the Country or Abroad, we undertake to send regular supplies of Photographic Materials and any other goods they may require. For this purpose, and in order to save the expense of small remittances, we open Deposit Accounts for any desired amount.

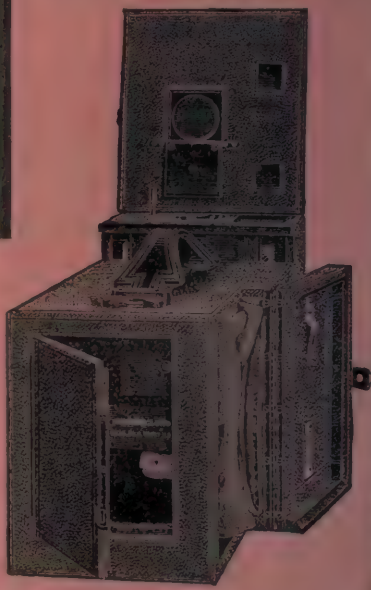
'N. & G.' Instruments cannot be sent on approval.



THE 'N. & G.' CAMERAS.

Front of a Pattern 'B' Instrument.

Opened to show the Shutter, the Lens and Mount, the Finders, the Index Plate with the Shutter-speed and Iris-Diaphragm Levers, the Pneumatic Release, &c., and (on the Lid) the Self-cap and Hand Release, the Finder Holes, and the two Locking Springs.



Back View of the same Camera.

With all the Doors opened, the Front raised, and the Ground Glass of the Focussing Screen removed. Showing the Bag, Lifter, and Lock of the Changing-box. The Handle, the Setting Knob, &c., and (on the Lid of the Front) the Automatic Spring-door, the Self-cap, and the Finder Covers.

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THE 'N. & G.' CAMERAS.

FOR HAND AND TRIPOD WORK.

Quarter-plate, 9 × 12 Centimètres, Five-by-four, Double-quarter, Half-plate, and Stereoscopic—for Plates or Films.

SEVEN DISTINCT PATTERNS.

THE 'N. & G.' CAMERAS were placed in the market at a time when the increased speed of Plates began to show the limitations entailed by long exposures, but when no instrument for serious *rapid work* was obtainable. So-called 'detective' and 'instantaneous' Cameras were, and are now, numerous enough; but these are made and used merely as toys, and their application being as limited as the results are uncertain, they appeal only to the general public knowing little or nothing of photography.

The **'N. & G.' Cameras** are the result of our constant endeavours to produce high-class instruments, capable of the finest work—whether artistic, scientific, or general—and absolutely reliable; in fact, instruments which shall meet the requirements of workers desiring to obtain technically perfect negatives under all sorts of conditions. They are the outcome of our long and exceptional experience in the production, and practical use, of high-class Cameras and Shutters for special purposes, and their construction embodies all the points essential for good photography, in combination with the utmost refinement of workmanship. The **'N. & G.' Cameras** proved an immediate success when first introduced. They are now acknowledged to be the *sine qua non* for perfect results, and are used by the leading experts at Home, on the Continent, and in the Colonies.

The principal considerations in the construction of the **'N. & G.' Cameras** are perfection of workmanship, and the utmost accuracy in all the adjustments. At the same time, the prices have been kept as low as possible, and the instruments will be found of exceptionally good value when their completeness, efficiency, and finish are considered.

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The 'N. & G.' CAMERAS

are now made in **Seven Patterns** to meet different requirements, but all are constructed on the same general lines. The following points distinguish the **'N. & G.' Cameras** from all others :—

1. The Body and Front are built separately, and effectually conceal and protect the working parts. There are no projections of any kind.

2. All the parts are arranged in the most convenient position for Rapid Work, whether used in the Hand or on a Tripod.

3. Any Lens or different Lenses can be used, and all the patterns (except one) provide Double or even Triple Extension.

4. Every part (Shutter, Changing-box, Focussing Device, &c.) is highly efficient, and yet quite simple in construction.

5. There is at all times easy access to the working parts for the purpose of cleaning, &c.

6. Every Adjustment can be made from the outside, so that the Camera need never be opened when in work, except for changing plates.

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8. All the materials employed are selected with the utmost care, many being specially prepared, and the workmanship is perfect throughout.

9. Every Camera is made for its own Lens or Lenses, and, practically, specially for each customer. All Scales are accurately measured and engraved.

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N. & G.' SYSTEM, see the 'COMPLETE CATALOGUE.'
Price 1/3, post free.

List of the Patterns, Sizes, and Prices of the 'N. & G.' CAMERAS.

Pattern.	Size of Plate (inches).	LENSES.		
		Wray or Swift F:8	Zeiss Anast. F:6.3	Zeiss Satz (3 foci)
A.	$4\frac{1}{4} \times 3\frac{1}{4}$	£13 0 0	£17 0 0	... ...
B.	$4\frac{1}{4} \times 3\frac{1}{4}$	14 5 0	18 5 0	... ...
	5 × 4 / 9 × 12 cm.	17 15 0	22 10 0	... ...
Special B.	$4\frac{1}{4} \times 3\frac{1}{4}$	... ...	... ...	£22 10 0
	5 × 4	... ...	... ...	27 10 0
	$6\frac{1}{2} \times 4\frac{3}{4}$	... ...	... ...	33 10 0
C.	$4\frac{1}{4} \times 3\frac{1}{4}$	16 0 0	20 0 0	... ...
	5 × 4	20 10 0	25 0 0	... ...
Half-plate	$6\frac{1}{2} \times 4\frac{1}{4}$ / $6\frac{1}{2} \times 4\frac{3}{4}$	... ...	27 5 0	... ...
Twin-lens	$4\frac{1}{4} \times 3\frac{1}{4}$	19 0 0	27 10 0	... ...
	5 × 4 / 9 × 12 cm.	25 0 0	35 0 0	... ...
Stereoscopic	$6\frac{1}{2} \times 4\frac{1}{4}$	20 0 0	28 10 0	... ...

The following HIGH-CLASS LENSES are supplied:—

For $4\frac{1}{4} \times 3\frac{1}{4}$ in.—Zeiss, Ser. II. No. 3, F:6.3 Anastigmat, $5\frac{1}{2}$ in. eq. focus, including original Mount and Iris Diaphragm.
Wray, or Swift, F:8 Rapid Rectilinear, $5\frac{1}{2}$ in. eq. focus, in special Cells.

For 5 × 4 in. and **9 × 12 cm.**—Zeiss, Ser. II. No. 4, F:6.3 Anastigmat, $6\frac{1}{16}$ in. eq. focus, including original Mount and Iris Diaphragm.
Wray, or Swift, F:8 Rapid Rectilinear, 7 in. eq. focus, in special Cells.

For $6\frac{1}{2} \times 4\frac{1}{4}$ and **$6\frac{1}{2} \times 4\frac{3}{4}$.**—Zeiss, Ser. II. No. 5, F:6.3 Anastigmat, $8\frac{1}{2}$ in. eq. focus, including original Mount and Iris Diaphragm.

SPECIAL B CAMERAS.

For $4\frac{1}{4} \times 3\frac{1}{4}$.—Zeiss Satz-Anastigmat, Ser. VIIa. No. 5. Foci: $5\frac{3}{4}$, 9, and $11\frac{1}{2}$ inches.

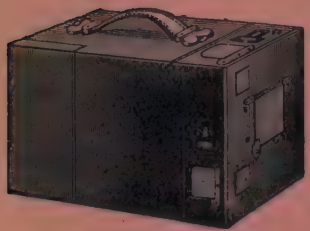
For 5 × 4.—Zeiss Satz-Anastigmat, Ser. VIIa. No. 8. Foci: 7, $11\frac{1}{2}$, and 14 inches.

For $6\frac{1}{2} \times 4\frac{3}{4}$.—Zeiss Satz-Anastigmat, Ser. VIIa. No. 11. Foci: $8\frac{1}{2}$, 14, and $16\frac{1}{2}$ inches.

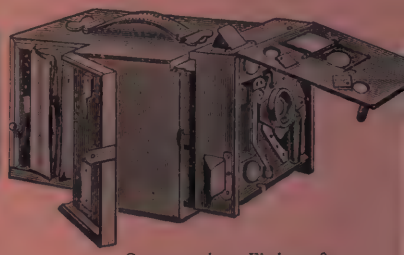
Any other Lens or Lenses can be fitted to order.

THE 'N. & G.' CAMERAS FOR HAND AND TRIPOD.

GENERAL SPECIFICATION, which applies to all Patterns.



'N. & G.' Camera closed. Ready for work.



Open, to show Fittings, &c.

SPECIFICATION.— Any Lens or Lenses; Iris Diaphragm Automatic Self-Cap; Automatic Spring-Door; Special High-efficiency Shutter, working between the lenses, made entirely of metal; Hermetically closed Pneumatic Regulation, giving automatic exposures from $\frac{1}{2}$ to $\frac{1}{100}$ second, and 'time' exposures at will; Hand and Pneumatic Releases 'N. & G.' Detachable Changing-Box for plates or films; two Special T Levels; two 'N. & G.' Real Image Identical View Finders; Special Focussing Screen; Central Rack and Pinion; Focussing Scale engraved from two yards to 'infinity.'

All woodwork well-seasoned Mahogany, every board clamped and cross-tongued; covered with Real Black Morocco of best quality obtainable. Special Wired Handle; Swivel Shoulder Strap; Tripod Screw and Bushes, &c.

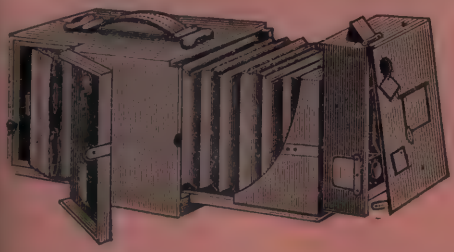
PATTERN A.—The simplest of the 'N. & G.' Cameras is exactly as per above specification, with the addition of a VERTICAL RISING FRONT.

For Size, Lenses, and Prices, see List, page 113.

THE 'N. & G.' CAMERAS FOR HAND AND TRIPOD.

PATTERN B.

For General Specification see page 114.



PATTERN B has, in addition :—

Vertical & Horizontal Rising Front, and Double Extension.

PATTERN B is the Camera which we particularly recommend for all-round work. It combines great simplicity with the utmost efficiency; it is light and small.

The **Double Rising Front** will be found indispensable when photographing buildings, &c., and, in connection with the accurate Finders and Levels supplied, it renders architectural work quite easy.

With its **Double Extension,** PATTERN B provides a power of still wider application. Lenses of considerable focal length may be used by its means; while, with the ordinary Lens, large heads can be taken, and flowers or any small objects may be photographed full size.

FOR SIZES, LENSES, & PRICES, SEE LIST, PAGE 11

Strong velvet-lined Leather Case, with best Lock and Fittings, ¼-pl. **21/-**, 5×4, **27/6.** *Soft Waterproof Cover*, ¼-pl., **5/6**; 5×4, **6/**

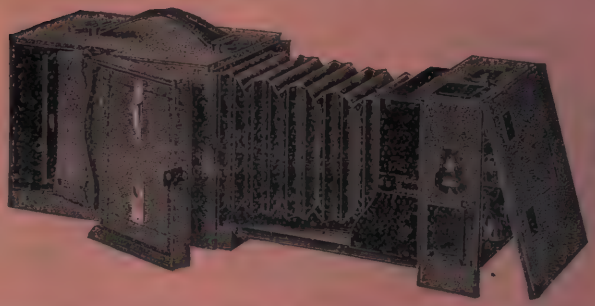
EXTRA FRONT for Wide-Angle Lenses (including alterations to Camera), ¼-pl., **25/-**; 5×4, **30/-.**

For 'CELERITAS' (high-speed) SHUTTER, see page 133.

THE 'N. & G.' CAMERAS FOR HAND AND TRIPOD.

SPECIAL PATTERN B.

For GENERAL SPECIFICATION see page 114.



For GENERAL SPECIFICATION, see page 114.

The SPECIAL PATTERN B has, in addition :—Vertical and Horizontal Rising Front, Triple Iris and Focussing Scales, and each Finder is marked for the three angles covered.

THE SPECIAL PATTERN B CAMERA has been designed in order to take full advantage of the new Zeiss 'Satz' Lenses (see page 137). These Lenses we have no hesitation in describing as the very finest in the market. The particular numbers of the series selected for the Special B are composed of two combinations of *different foci*: so that by using one single combination or the other, or the complete lens, *three* focal lengths are readily available. The single combination of a Zeiss 'Satz,' it should be noted, is not a 'make-shift,' like that of an ordinary R.R. Lens, but an optically complete instrument, rapid, perfectly corrected in itself, composed of four elements cemented together, and capable of the finest work.

NOTE.—The full aperture of a Zeiss-Satz Lens giving *three foci* is *f*.7. The same lenses if fitted with similar combinations, *i.e.*, giving *two foci*, have a full aperture of *f*. 6.3.

The Special Pattern B is the most complete Camera that money can buy. It is particularly recommended to artists, naval officers, travellers—in fact, to all workers who have learned to appreciate the true value of using Lenses of different foci at will.

FOR SIZES. LENSES, and PRICES, see List, page 113.

Strong Velvet-lined Leather Case, with best Lock and Fittings, ¼-pl., 25/-; 5×4, 30/-. *Soft Waterproof Cover*, ¼-pl., 5/6; 5×4, 6/-

EXTRA FRONT for Wide-angle Lenses (including alterations to camera), ¼-pl., 25/-; 5×4, 30/-

For 'CELERITAS' (high-speed) SHUTTER, see page 133.

THE 'N & G.' CAMERAS FOR HAND AND TRIPOD.



SPECIAL PATTERN B.

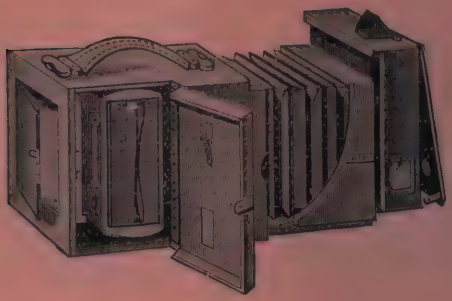
THE three accompanying blocks, drawn from a Set of Quarter-plate Negatives, all taken *from exactly the same spot*, will give some idea of the power which the Special Pattern B 'N. & G.' Camera places in the hands of the photographer. Quite apart from its uses in the hands of an artist, the advantages which the Special Pattern B offers with its long focus Lenses must be evident to every worker. It often happens that objects which to the eye seem of important ance in a picture, are so far away from the Camera, that when photographed with lenses of the usual foci. they are represented by quite insignificant specks in the resulting negative. Distant mountains, ships far out at sea, buildings across a river, &c., have generally to be left untaken for this reason. By means, of the Special Pattern B Camera, however, such objects may be easily photographed the same apparent size, and in the same relative proportions which they present to the eye.





THE 'N. & G.' CAMERAS FOR HAND AND TRIPOD.

PATTERN C.



For GENERAL SPECIFICATION see page 114.

Pattern C has, in addition:—

Vertical and Horizontal Rising Front, Double Extension, Swing-Back with Plumb Indicator.

PATTERN C combines the efficiency of a high-class Hand-Camera and the best Field-Camera: it is in great demand among those workers who require an apparatus with which they can photograph **everything.**

The **Swing-Back** is indispensable for difficult architectural work, especially for interiors. When using this movement, the Lens must, of course, be considerably stopped down; the Camera should therefore be placed on a tripod for such work.

For Sizes, Lenses, and Prices, see List, page 113.

Strong Velvet-lined Leather Case, with best Lock and Fittings, ¼-pl., **25/-**; 5×4, **30/-**. *Soft Waterproof Cover*, ¼-pl., **6/-**; 5×4, **7/-**

EXTRA FRONT FOR WIDE-ANGLE LENSES, including alterations to Camera, ¼-pl., **25/-**; 5×4, **30/-**

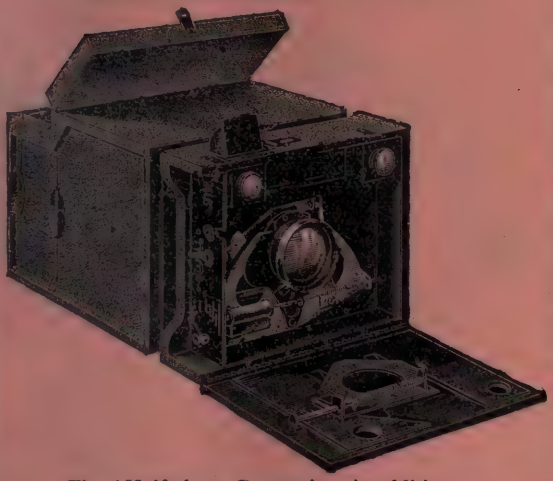
The **WIDE-ANGLE FRONT** is particularly useful with this Pattern, which is specially designed for Architectural Work.

For 'CELERITAS' (high-speed) SHUTTER, see page 133.

THE 'N. & G.' CAMERAS FOR HAND AND TRIPOD.

HALF-PLATE PATTERN.

For General Specification see page 114.



For General Specification see page 114.

The 'Half-plate Pattern has, in addition :—

Vertical and Horizontal Rising Front, and Double Extension.

(*The Shutter, Changing-box, and other Fittings are of special construction.*)

THE Half-plate 'N. & G.' Cameras which we have supplied have proved highly successful. In order to meet the increasing demand for larger Cameras, we have given this pattern our special attention, and feel sure that it is as perfect and as easy to use as any of the other 'N. & G.' Instruments. The Shutter, even with an aperture of *f*/6.3, gives the full range of regulation : $\frac{1}{2}$ to $\frac{1}{100}$th second automatic exposures, and 'time' exposures at will.

This pattern is made in two sizes—Half-plate ($6\frac{1}{2} \times 4\frac{3}{4}$ in.) and Double-Quarter ($6\frac{1}{2} \times 4\frac{1}{4}$ in.).

Note.—In order further to reduce the size and weight, Half-plate and Double-Quarter Cameras are usually made *shorter* than the full focal length of the Lens. Customers preferring their Cameras to be full infinity length (*i.e.*, always ready at 'infinity') will please advise to that effect when ordering.

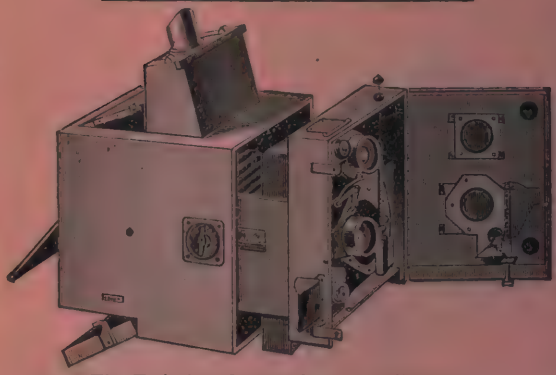
For Lens and Prices, see List, page 113.

Strong velvet-lined Leather Case, with best Lock and Fittings, **35/-**
Soft Waterproof Cover, **9/6.**

THE 'N. & G.' CAMERAS FOR HAND AND TRIPOD.

TWIN-LENS PATTERN.

For GENERAL SPECIFICATION see p. 114.



For GENERAL SPECIFICATION see p. 114.

The Twin-lens Pattern has, in addition :—

Horizontal Rising Front, Double Extension, two accurately paired Lenses, 'N. & G.' full-size image Focussing Device.

This Camera has two Lenses, which, by careful adjustment, are made exactly coincident. The importance of seeing an exact duplicate of the image, not only up to, but even *during* the time the actual exposure is made, will be at once apparent.

The 'N. & G.' Focussing Device is now well known. It is absolutely efficient in any light ; it is quickly brought into use, and as rapidly made to disappear. Altogether, the 'N. & G.' Twin Lens Camera is the most complete and perfect instrument the photographer could possess for the special work for which it is intended—animals and similar subjects at close quarters, and taken with large apertures. For Landscape and general work this instrument is, of course, quite as efficient as the other 'N. & G.' patterns, and it is the favourite Camera of many of our leading experts, in spite of its necessarily larger size.

For Sizes, Lenses, and Prices, see List, page 113.

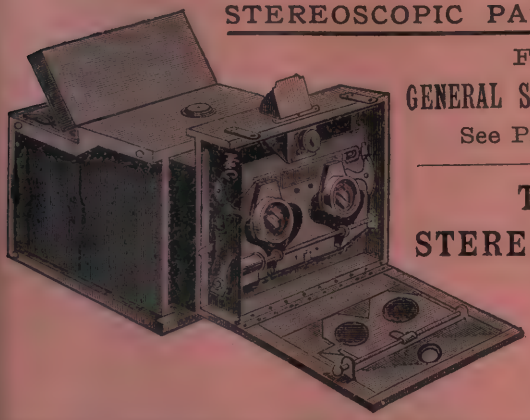
Strong velvet-lined Leather Case, with best Lock and Fittings:
¼-pl., **30**/- ; 5×4, **35**/-.

Soft Waterproof Cover : ¼-pl., **8**/- ; 5×4, **9**/**6**.

For 'CELERITAS' (high-speed) SHUTTER, see page 133.

THE 'N. & G.' CAMERAS FOR HAND AND TRIPOD.

STEREOSCOPIC PATTERN.



FOR GENERAL SPECIFICATION See Page 114.

The STEREOSCOPIC Pattern

has, in addition :—

VERTICAL RISING FRONT, DOUBLE EXTENSION, TWO ACCURATELY PAIRED LENSES, DOUBLE SHUTTER, DOUBLE IRIS DIAPHRAGM, AND DOUBLE SELF-CAP. $6\frac{1}{2} \times 4\frac{1}{4}$ CHANGING BOX.

THE Shutter, Iris diaphragms, &c., naturally form the essential features of this pattern, and these have been proved to be perfect in every respect. No work, probably, requires such absolute perfection as Stereoscopic Photography, and the Stereoscopic 'N. & G.' always receives our utmost care and attention to details. The size of the plate adopted is the 'Double-Quarter,' $6\frac{1}{2} \times 4\frac{1}{4}$ in.; not only because it is eminently suitable for Stereoscopic pictures, but because, with the 'N. & G.' Changing Box, it is perfectly immaterial whether **two ordinary quarter plates** are used instead of the $6\frac{1}{2} \times 4\frac{1}{4}$ in. plate. A point of the utmost importance with the 'N. & G.' Stereoscopic Camera is that either **12 Stereoscopic Views or 24 single Quarter-Plate Pictures** may be taken. When using the camera for single Quarter-Plate exposures it is only necessary to close the right and left spring doors alternately. This Camera can be used for Double-Quarter, Quarter-Plate, or Stereoscopic work by having an 'N. & G.' Half-Plate (Double-Quarter) Front fitted. The Septa of the bellows and changing-box are made easily removable.

For Lenses and Prices, see List, page 113.

Strong velvet-lined Leather Case, with best Lock and fittings	**30/-**
Soft Waterproof Cover	**8/-**



THE 'N. & G.' EIFFEL STAND.

The strength of this Tripod essentially depends on the mechanical principle adopted in its construction; and as this permits the use of very light materials, the 'Eiffel' presents a combination of extreme rigidity and lightness which never fails to surprise those who see it for the first time.

The materials used are specially selected, and all the parts are made and fitted by hand. For strength, durability and lightness the N. & G. 'Eiffel' Stand has no equal. It is easily set up, and as readily folded; and although it will hold Cameras up to whole-plate size, it is the Hand Camera worker's tripod *par excellence*.

Height of Stand, 4 ft. 8 in.

Measurements when closed, 2 ft. 6 in. × 1¼ in. × 1⅝ in.

Weight, 1-lb. 1-oz.

PRICE, including Light Waterproof Cover and one 'N. & G.' Tripod Screw:

Size No. 1 ... ... 24/- | Size No. 2 ... ... 28/6

Postage, 6*d*.

TRIPOD SCREW.



This is the neat contrivance which is supplied with the '*N. & G.' Cameras*. It is very light and well made. A pin on the side of the Screw stops it when it has penetrated deep enough into the side of the Camera. The fly-nut is then used to clamp the Camera down. This fly-nut has a free run of one inch, so that the Screw can be used with any thickness of Tripod head.

PRICE, in Oxidised Brass, complete with two Bushes, 1s. 6d. each. Postage, 2d.

STRAPS

For carrying Hand Cameras.

A Camera, when not in actual use, should be carried suspended from the shoulder by means of a suitable Strap. We make three kinds of Straps or Slings for the purpose.

Best Hand-Sewn Leather Strap, ½ in. wide, with Brass plated Swivels (as supplied with ¼-plate 'N. & G.' Cameras). Price **2/6**, postage **2d.**

Broad Canvas Webbing Sling, 2 in. wide, with Hand-Sewn Leather Ends and bronzed Steel Swivels (as supplied with 5 × 4 and larger 'N. & G.' Cameras). Price **4/6**, postage **3d.**

Set of Broad Canvas Webbing Knapsack Straps, to attach to the Leather Case of the Camera, complete with Fittings. Price **7/6** the set, postage **3d.**

THE
'N. & G.' Telemeter.



N. & G.' TELEMETER.

THIS little instrument is designed to enable Hand-Camera workers to measure the distance of any person or object with accuracy, and without attracting attention. By looking along the 'sights' towards the *base* of the subject to be photographed, the index will show the angle formed between the line of sight and a perpendicular drawn to the feet of the observer—this angle depending entirely on the distance of the subject. The scale is accurately measured, and gives a direct reading in yards.

A small arrow at the end of the scale indicates when the pointer is exactly at right angles with the straight edge of the Telemeter. Therefore, the Telemeter can also be used to accurately level the camera when on the tripod, by holding the top edge of the Telemeter against the top edge of the camera.

Instructions for Measuring Distances.

Place the thumb of the right hand at A, the third and second fingers at B and C respectively, and the first finger *over* D. Hold the Telemeter vertically in front of the eye, and lower it till both sights cover the base of the subject (the feet of a person, the base-line of a building, &c.). Now press the first finger on D, and the pointer will be fixed on the scale, and will indicate the distance.

The instrument is graduated for *level* ground. If the subject stands higher than the observer, a proper allowance should be made, *i.e.*, it should be imagined prolonged downwards to the level of the observer's feet.

The 'N. & G.' Telemeter measures $1\frac{5}{8} \times 1\frac{5}{8}$ *in. only, and is made of Aluminium.*

PRICE, complete with leather Pocket Case, 2/- Postage 1*d.*

. . THE . .

'N. & G.' Isochromatic Screens

FOR the correct rendering of the different tints of green, &c., in a Landscape, and for photographing coloured objects of all kinds, the use of isochromatic plates, in conjunction with suitable screens, is essential.

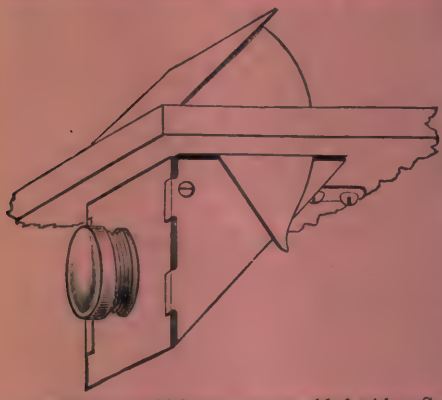
The 'N. &. G.' Screens are made of especially manufactured glass, free from distortion, and are so mounted that they can be placed on the Lens like a cap.

Price, ¼-Plate (each), **5/6**; 5×4, **6/6**. Velvet lined Pocket Cases, ¼-Plate (each), **2/-**; 5×4, **2/6**.

A medium tint, suitable for general Landscape work, will be supplied when not otherwise ordered. *Postage*, **2***d*.

The 'N. & G.' (Real Image) Finders for Hand Cameras.

THE Finders which we fit to all the 'N. & G.' Cameras, and which we supply to the Trade in large numbers, have proved such a success—being absolutely reliable—that we offer them here separately. Amateurs who are making or altering their own Cameras, and who are not satisfied with ordinary Finders, will find in the 'N. & G.' pattern a well-made article.



The 'N. & G. Finder is made entirely of brass, or aluminum, by costly tools, and *without soldering*. It has a special Lens of an angle suitable to the view, a finely-ground Screen, and a selected Reflector.

The Lens can be focussed with exactitude, and is accurately centered for each Finder. It gives a *fixed*, *real*, and *very bright image*, and is not subject to parallax or to secondary reflections, as are all Finders which are not provided with a Screen, and which give only a 'virtual image.'

The interior can be got at by unscrewing the Lens; the Finder can, therefore, always be kept free from dust. One single screw clamps the apparatus firmly together.

Oxidised Brass or Blacked Aluminium HOODS and CLAMPS, for fitting over the Finders outside the leather covering of the Camera (as used in the 'N. & G. Cameras), can also be supplied.

Brass Finders (each), **3/-**; Hood and Fitting, the Set, **-/8**. Aluminium Finders (each), **6/-**; Hood and Fitting, the Set, **1/6**. *Postage*, **2***d*.

THE 'N. & G.' CHANGING BOXES,

FOR USING PLATES OR CUT FILMS IN FIELD OR HAND CAMERAS.





THE success of the 'N. & G.' Changing Boxes (as used in the 'N. & G.' Cameras) has been so great, that no photographic outfit can now be considered complete without them. They are readily detachable, and each taking 12 plates, or 24 films, the number of exposures a photographer can make (especially in connexion with the 'N. & G.' Re-fill Boxes and Changing Bag) without returning to a dark-room, is practically unlimited. Thousands of 'N. & G.' Changing Boxes of all sizes have been sold, and during the five years they have been in the market in their present form, not one has been known to fail. The quality of the materials employed, and the workmanship of all the parts, have been brought to the highest degree of perfection, and they are steadily superseding the bulky and awkward dark slide for field work, and the complicated and unreliable 'automatic changing' devices in Hand Cameras. The Boxes are made in two patterns :—

A, cut to the smallest dimensions, for use in the 'N. & G.' and other Hand Cameras.

B, with a large front, which can easily be cut down to fit the reversing back of any Field Camera, or Hand Cameras made for Dark Slides.

Either pattern is made in two forms :—

No. 1 contains 12 Carriers to take plates of any thickness. They are made of thin steel, and are not only very light but exceedingly strong. A corrugation at each end of the Carrier prevents any scratching of the sensitive surface. By means of 12 Film Holders, supplied with every box, cut films may also be used in the above Carriers. This, indeed, is the only method of keeping cut films absolutely flat during exposure, for they are firmly held all round the four sides.

No. 2 contains 24 specially thin Carriers for *cut films only*. With these Carriers no Holders are necessary.

A point of the utmost importance in all the 'N. & G.' Carriers, is that the **sensitive surface** of the plates or films comes in contact with the register of the Box ; the varying thickness of the different materials used is, therefore, of no consequence.

Using an 'N. & G.' Changing Box is the only way to avoid pin-holes and double exposures—the two greatest troubles of the photographer.

The aluminium **Spring Partition** contained in each box always keeps a steady pressure on the Carriers, both in front and behind, and prevents the plates from rattling. The edges of the plates touch nothing but steel.

An automatic **Index** constantly indicates the *number of Exposures* made.

CHANGING BOXES.			Plate Carriers. Film Holders. Film Carriers. For Boxes Nos. 1 or 2. Per Dozen.	
Size.	Outside Measurement.	Price each Pattern A or B.	Steel	Aluminium.
4¼ × 3¼ in.	4⅜ × 4½ × 2½ in.	45/-	4/-	6/6
9 × 12 cm.	133 × 122 × 63mm.	55/-	5/-	8/-
5 × 4 in.	5½ × 5¼ × 2½ in.	55/-	5/-	8/-
6½ × 4¼ ,,	7⅜ × 5½ × 2½ in.	75/-	7/6	15/-
6½ × 4¾ ,,	7⅜ × 6 × 2⅝ ,,	75/-	7/6	15/-

ANY OTHER SIZE TO ORDER.

Strong velvet-lined Leather Cases, with shoulder strap, to take the 'N. & G.' Boxes :—

Pattern.	4¼ × 3¼	5 × 4 9 × 12 cm.	6½ × 4¼	6½ × 4¾
A	10/-	12/-	15/-	15/-
B	12/-	15/-	17/6	17/6

The 'N. & G.' Re-fill Boxes.

THE safest method of packing plates for travelling is to place them in the **'N. & G.' Carriers;** as each plate is protected by its own metal sheath, no breakage need be feared, however roughly the packages may be handled.

The **'N. & G.' Re-fill Boxes** entirely obviate the trouble and risk entailed by changing plates. They take **12** plates, or **24** films, in their Carriers, ready to be changed for the exposed plates or films in the Changing Boxes. The **'N. & G.' Re-fill Boxes** are composed of three separate strong cardboard boxes, lined inside and out, and with all edges protected by canvas impervious to light. They weigh but little more than ordinary plate boxes, and are much stronger. They are fitted with a detachable celluloid label for recording when the contents are exposed.

A Photographer setting out on a trip with two or three **'N. & G.' Changing Boxes,** and all his stock of plates or films in **Re-fill Boxes,** need waste no time for changing plates, nor fear scratches, dust, or broken glass.

Size.	With 1 dozen Plate Carriers.	With 1 doz. Plate Carriers and 1 doz. Film Holders, or 24 Special Film Carriers.
¼-plate	**5/6** each	**9/6** each
5×4	**7/6** ,, ...	**12/6** ,,
½-plate	**10/6** ,, ...	**18/-** ,,

THE IMPROVED * * * * *

'Eclipse' Changing Bag.



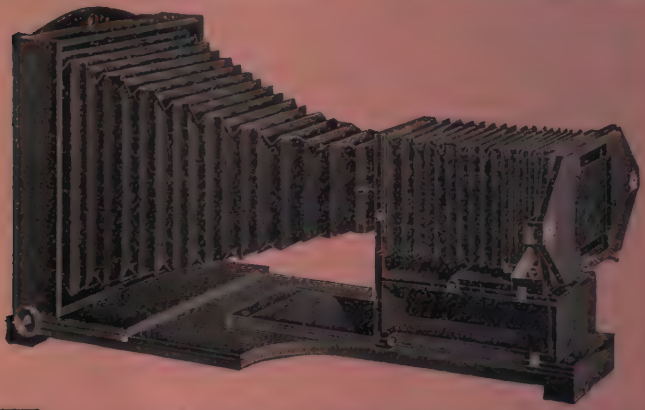
BY means of our improved **Changing Bag**, plates may be changed without a dark-room, in any light; so that a worker using **'N. & G.' Changing Boxes, 'N. & G.' Re-fill Boxes,** and this **Changing Bag**, is independent of everything. This complete system has entirely done away with the principal troubles of the travelling photographer. The **Improved 'Eclipse' Changing Bag** is made with the utmost care. Each is tested before being sent out, and will be found absolutely safe with the fastest plates.

No Trouble to Use.
Will Pack Anywhere.
Weighs but 1 lb.

Price 10s. 6d. each.
Postage 5*d.*

✶ THE 'N. & G.' ✶

Enlarging ⁘ Camera.



TO produce good Photographs, large enough in size to be effective on the walls of an exhibition, or at home, the best method is to make a *small negative*, ¼ *to* ½*-plate*, as perfect as possible, and then *to enlarge* the picture to a suitable size. But the usual methods of enlarging (by means of a lantern, or by throwing the image on an easel in a darkened room) are troublesome, and, except in the hands of professionals who are constantly at this work, unsatisfactory.

The 'N. & G.' Enlarging Camera is a high-class instrument, which enables the worker to enlarge, copy, or reduce his negatives without loss of time, and with a certainty of perfect results. It will enlarge from ¼, 5 × 4, and ½-plate negatives or transparencies up to 15 × 12 in., and will reduce down to lantern slide size—3¼ × 3¼ in. The instrument is made of blacked Mahogany, and is of the most perfect workmanship and finish throughout; it is, in fact, like the 'N. & G.' Cameras, made entirely by hand and carefully adjusted, regardless of cost of manufacture, and with the sole aim of supplying photographers, able to appreciate its value, with a tool highly efficient and capable of producing technically perfect work.

Description.—The 'N. & G.' Enlarging Camera consists of a strong Base-board, supporting at one end the special apparatus for holding and adjusting the negatives, a 15 × 12 in. Camera at the other end, and the Lens and Shutter-board in the centre. All these parts are connected by means of strong Bellows; no light can, therefore, enter the camera except through the negative. The Base-board is fitted with tripod bushes, so that the apparatus may be screwed on any convenient stand.

Negative Holder.—The method adopted for adjusting the negatives is perhaps the most distinctive feature of the 'N. & G.' Enlarging Camera. The front part of the Camera consists of a square frame of wood, attached to the Bellows, and pivoted between strong metal supports. This frame takes the detachable Negative Holder ; it can be swung backwards and forwards, and thereby provides adjustment for correcting lines out of perpendicular in vertical or horizontal pictures.

The Negative Holder is readily detached from the Camera. It consists of two frames held together by strong springs, but which can be moved one upon the other in any direction. The outer frame holds the negative to be reproduced, and a ground glass screen for diffusing the light, if necessary. The inner frame carries the cut-out masks determining the *shape* of the picture. It is only necessary to insert the two pins projecting from this inner frame into corresponding slots in the Camera front, in order to fix the Holder firmly in position.

It will be evident that either the whole or any part of the picture may be reproduced, and that any detail thus selected (by sliding one frame over the other) will be *automatically centered* when the Holder is fixed to the Camera.

Lens and Shutter.—The Lens and Negative Holder travel together along the Base-board, and can be clamped in any position. The distance between the Lens and the Negative is adjustable, and determines whether the picture is *reduced*, *enlarged*, or *copied* same size. Any Lens from ¼ to ½-plate size may be used. The Shutter is actuated from outside the apparatus, by turning the knob over the Lens-board clamp. It works smoothly and without vibration.

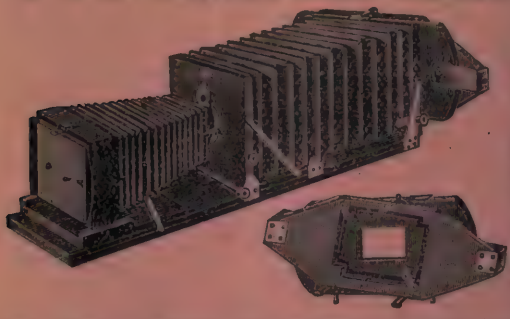
Dark Slides.—Single 'Solid' Slides of special construction are used with the 'N.&G.' Enlarging Camera. The Shutter pulls right out, and the back is detachable. The Slides will take Plates for *Enlarged Negatives or Transparencies*, or Bromide Paper for *Direct Enlargements*. For holding paper absolutely flat a metal Carrier is supplied with each Slide.

Focussing.—A separate ground glass Focussing Screen is provided, and the Camera is fitted with Rack and Pinion for focussing.

The 'N. & G.' Enlarging Camera can be used with artificial light by lighting the negative with a lantern or condenser. Daylight, however, is recommended, as it is far more convenient and powerful. The picture may be enlarged direct on Bromide Paper; but when quality is aimed at, and several copies of the enlargement are required, an *Enlarged Negative* should be made. With either method the 'N. & G.' Enlarging Camera will produce large prints equal in every respect to pictures of the same size taken direct.

PRICE of the Apparatus for **Enlarging** from ½-plate to 15 × 12, with one 15 × 12 Dark Slide, two extra Carriers for enlarging from ¼-plate to ½-plate, and Focussing Screen	£10	10	0
Extra 15 × 12 Dark Slides, with Holder for Bromide Paper ...	1	15	0
Extra Plate Carriers	0	5	0
Extra Negative Carriers	0	2	6

'N. & G.' LANTERN-SLIDE REDUCING CAMERA.



THE superiority of Slides made *by reduction* in the Camera over those produced by printing in contact is admitted by experts. Quite apart from the risk of injuring the negative, ever present in the latter method, it is impossible to secure absolute contact all over two plates of glass, and the sharpness of a 'contact' is always inferior to that of an optically-produced Slide. Besides, when printing by contact, figures are often rendered far too large for the Screen, and the more pictorial shape of the usual photographic plate is lost in the circle or square of the contact-printed Lantern-Slide.

The 'N. & G.' Reducing Camera thoroughly obviates these drawbacks, and is used by the leading workers. We have recently further improved this Camera, and can thoroughly recommend it as a serious instrument, every part of which is carefully constructed to attain the object in view—the production of technically perfect Slides with a minimum of trouble.

This apparatus, as regards its general design, is practically a miniature of the 'N. & G.' Enlarging Camera. It reduces ½-plate (or ½-plate) to 3¼ × 3¼. Any Lens of about 5½ in. equivalent focus may be used; with a 5½ in. Lens the entire image may be *reduced* to half the size, or any small detail *enlarged* up to two diameters.

The **Negative Holder** is detachable, and provides *universal adjustment* of the Negative in any plane. The **Dark Slides** are particularly neat, and convenient to use. A Lever for fine focussing, a detachable **Focussing Screen,** a **Shutter** working without the slightest vibration, and all necessary fittings are supplied.

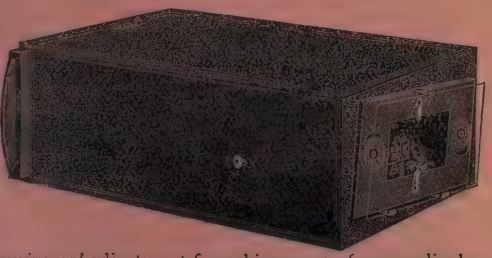
For a full Description, see the 'N & G.' 'Complete Catalogue.'

Daylight, or any artificial light, may be employed for reducing with this Camera; the former, however, is to be preferred. All the adjustments are easy, and the Camera is exceedingly light and small, and may be placed anywhere. These features render the production of Lantern Slides, by means of the 'N. & G.' Camera, a perfectly simple and delightful occupation, and every photographer, whether a regular lanternist or not, should possess this Instrument.

PRICE of the Apparatus for Reducing from ½-plate, with one 3¼ × 3¼ in. Dark Slide, and Focussing Screen	£3	10	0
The same, for reducing from ½-plate	4	10	0
Wray, 5½ in., *f.* 8 R. R. Lens, with Rotating Stops	2	5	0
'Cooke,' 5 in., *f.* 6.3 Lens, with Iris Diaphragm	4	0	0
Extra Dark Slides ... ... each	0	5	6

The 'N. & G.' Enlarger,

For making Whole-plate Prints from Quarter-plate Negatives.



THE 'N. & G.' Enlarger is a cheap but thoroughly efficient apparatus for obtaining enlargements of the highest quality. It is *always ready*, can be used anywhere, and, while requiring no adjustment whatever for ordinary work, yet admits of *universal* adjustment for subjects out of perpendicular, or out of centre.

The body of the Camera is a strong cloth-covered box. The anterior end carries the Negative Holder, and the Dark Slide springs into the other end; a rigid partition bears the Lens and Shutter.

The negative is placed in the movable **Holder,** which for the usual run of work is kept exactly central. By unscrewing the caps of the clamps, the Holder will be free to move in any direction at right angles to the optical axis, thus providing ample correction for errors in the negative.

The '*N. & G.*' *Enlarger* is supplied complete with a 5 in. **Swift** R. R. Lens. This is accurately fixed at its critical focus, and need never be touched except for cleaning. A **Shutter** actuated from outside, a strong 'single' **Dark Slide,** and a ground glass **Screen** for focussing (and diffusing the light if necessary) are supplied. The Slide will take Plates for *Enlarged Negatives*, and, by means of the Metal Carrier sent with each Slide, Bromide Paper for *Direct Enlargements.*

For a full Description, see the 'N. & G.' 'Complete Catalogue.'

The 'N. & G.' Enlarger being always ready for work, it will give a whole-plate enlargement on Bromide Paper, or a transparency on a Plate in less time than would be required to obtain a direct print from the same negative. In fact, by its means, negatives may be enlarged before they are dry. The price has purposely been kept as low as possible, so as to place it within the reach of all workers, but the instrument is carefully made, and may be thoroughly relied upon.

PRICE of the Apparatus for Enlarging from ¼-plate to ½-plate, complete with Swift 5 in. R. R. Lens, and one Dark Slide	£3	10	0
The same, for enlarging from 5×4 to 10×8, complete ...	5	5	0
Extra ½-plate Dark Slide, with Holders for Bromide Paper ...	0	15	6
Extra 10×8 Dark Slide, with Holder for Bromide Paper ...	1	1	0

THE 'N. & G.' ALUMINIUM BLIND SHUTTER.

With Pneumatic Regulation, Release, and Stopping Gear.

The 'N. & G.' BLIND SHUTTER is a neat, light, and thoroughly reliable instrument, constructed throughout on sound mechanical principles. All outer and inner details are perfect in workmanship and finish, and every 'N. & G.' SHUTTER will last out many of the cheaply made wooden shutters commonly used.



The speed depends on the resistance of air, and is carefully tested for, and accurately engraved on, each Shutter. Size B gives automatic exposures of $\frac{1}{2}$ to $\frac{1}{60}$th second, and 'time' exposures of any duration without the necessity of keeping the ball pressed all the time. The 'N. & G.' BLIND SHUTTER further presents the following unique advantages :—

Neither with time nor with rapid exposures is there the slightest noise or vibration.

All working parts are of *metal*.

The outer Case and the Rollers are made *entirely of aluminium*.

The Shutter is set by a metal rack ; there is therefore no string to pull and strain the Camera, and no annoyance by this string breaking or catching in the fittings in windy weather.

The Blind can be easily replaced.

The 'N. & G.' ALUMINIUM BLIND SHUTTER *will work for years in the most trying climate.*

It can be fitted : *on the Hood* or the *front of the Lens*, at *the back of the Lens*, or *between the Combinations*.

Size.	Aperture up to (inches).	Speed (seconds).	Price. £	s.	d.
B	$1\frac{1}{2}$	$\frac{1}{60}$	2	5	0
C	2	$\frac{1}{50}$	2	15	0
D	$2\frac{1}{2}$	$\frac{1}{40}$	3	15	0
E	3	$\frac{1}{40}$	5	0	0

Complete with ball and tube.

Cost of fitting behind the Lens or between the combinations, or for fitting the same Shutter to several Lenses—extra, according to requirements.

PIG-SKIN POCKET CASES :

Size B ... 4/6 | Size C ... 5/6 | Size D ... 7/6 | Size E ... 8/6

THE 'CELERITAS' (High Speed) SHUTTER.

(With Pneumatic Stopping Gear.)

THE 'CELERITAS' (High Speed) SHUTTER, which we placed in the market some years ago, has thoroughly met all the difficulties connected with rapid work; and, in its present improved and simplified form, it is as easy to use as any ordinary 'N. & G.' Shutter. It works in the only admissible position—*i.e., between the combinations* of the Lens. Every part of the image is therefore exposed simultaneously, and for exactly the same fraction of time, and distortion is impossible.

The 'Celeritas' (High Speed) Shutter is made entirely of metal, and is designed with a view to obtaining a maximum degree of speed and high efficiency, combined with due strength of all the parts. The moving blade is of aluminium, only $\frac{1}{100}$th inch thick, and this is propelled by a powerful steel spring, without the slightest shake or vibration while the exposure is made. At the end of each revolution of the Exposing Disc, a powerful Air Brake comes into operation, and the Shutter is stopped by the resistance of the compressed air; so that, in spite of the enormous blow, there is practically no jar, and no part is in the least damaged even after years of constant work. An improved cam and lever arrangement renders the winding of the spring (for setting the Shutter) quite easy.



The Shutter gives three speeds, which for a Lens of 1-inch aperture are $\frac{1}{25}$th, $\frac{1}{50}$th, and $\frac{1}{100}$th of a second.

The workmanship and finish of the apparatus are necessarily of the very finest description, and only that enables us to attain the above results.

The 'Celeritas' (High Speed) Shutter exactly meets the requirements of workers interested in horse racing, athletics, and sports; and it is the only practical and efficient instrument for obtaining perfectly sharp studies of animals running, birds on the wing, and rapidly moving objects of all kinds. The images it gives are *absolutely correct in drawing*. The 'Celeritas' is, therefore, indispensable for artistic and scientific work.

For full Description, and Specimens of Work, see the 'N. & G.' COMPLETE CATALOGUE.

Price of 'CELERITAS' (High Speed) SHUTTER, 1-inch Aperture, fitted between the combinations of any suitable Lens **£3 10 0**

Pig-skin Pocket Case for Shutter **0 6 0**

When ordering please send the Lens complete, the original Mount of the Lens will be returned intact.

The 'Celeritas' Shutter can be made easily interchangeable with the 'Standard' Shutter of any 'N. & G.' CAMERA.

Making both Shutters interchangeable—

If the 'Celeritas' is ordered with the Camera **£1 0 0**

If ordered after the Camera is made **1 10 0**

The 'N. & G.' Plates,

FOR HAND CAMERA WORK.



THE 'N. & G.' PLATES have been placed in the market in order to provide users of 'N. & G.' Cameras, and others, with a reliable material, rich in Silver, and of Uniform Speed. They are prepared from ***Picked Emulsion,*** coated on ***Specially Thin Glass.***

While the highest possible degree of Rapidity is essential in Plates intended principally for Hand Camera work, we have not aimed to secure speed at all costs, and to the detriment of other equally important qualities —Fineness of Grain and Freedom from Fog. ***The 'N. & G.' Plates*** will be found to produce excellent Negatives, rich in half-tones and the finest detail. They develop easily to full printing density, and are absolutely free from pinholes or other blemishes, which are particularly annoying in small negatives intended for Enlarging, Lantern Slides, &c.

We stock our Plates in all Hand Camera sizes, either ***Plain,*** or ***Backed with Forester's Effective Backing.***

PRICES.

Size.	Plain.	Backed.	Postage.
$3\frac{1}{4} \times 2\frac{1}{8}$ inch	1/-	1/4	-/3
$4\frac{1}{4} \times 3\frac{1}{4}$ "	1/6	2/-	-/4
9 × 12 centimètres.....	1/10	2/4	-/5
5 × 4 inches	2/6	3/-	-/5
$6\frac{1}{2} \times 4\frac{1}{4}$ "	3/3	3/10	-/6
$6\frac{1}{2} \times 4\frac{3}{4}$ "	3/8	4/3	-/6

THE 'N. & G.' DEVELOPER,

FOR HAND CAMERA WORK.

THIS is a **Pyro-Soda Developer**, prepared from the Purest Chemicals and Distilled Water, according to a Special Formula. It preserves the full energy of the ingredients undiminished for any length of time, and gives Brown Negatives of excellent quality, which can be made 'Soft' or 'Plucky' at will, to suit any printing process.

No other Developer will give such good Negatives of 'CELERITAS' (high speed) Exposures.

Price 3s. 6d. the Set of Two Bottles Concentrated Solutions.
Packing and Postage, 1s.

FORESTER'S EFFECTIVE BACKING

FOR PREVENTING HALATION.

BACKED PLATES are an absolute necessity when the best possible results are aimed at. Although all experienced Photographers are agreed to this, most plates are still used unbacked; this is owing to the fact that it is impossible to obtain a satisfactory material unless prepared in large quantity from specially selected ingredients. As is well-known, home-made and other Backing is apt to remain sticky, or to become granular and occasion dust—in either case it is worse than useless.

Forester's Effective Backing is prepared from the finest ingredients, and is put up in a most convenient form. It will keep for months, and is always ready for use. It sets in a few minutes, into a dry, horny film which cannot even be scratched off; yet the slightest touch with a wet sponge or cloth will at once remove the Backing.

Forester's Effective Backing is a boon to Photographers, both professional and amateur. Better negatives (in Landscape, Hand Camera, and other work) are obtained in nearly all instances by using this Backing, and in subjects where there is any danger of **HALATION**, such a precaution becomes indispensable.

Price, in collapsible ¼-lb. Tubes, with full Instructions, **1/6** each;
Post Free, **1/9.**

THE 'N. & G.' PRINT TRIMMER

IS a well-made **Steel Square,** 5×4 inches, divided into eighths, with which small pictures (¼-plate and 5×4) may be trimmed easily and accurately. It will be found particularly useful by artistic workers who understand that every picture must be specially trimmed to improve the composition; it is also very convenient for cutting Lantern Masks with square corners, or masks for making prints with wide, clear margins, in Platinotype, Carbon, &c.

Price 4s. 6d. each. Post Free, 4s. 8d.

THE 'N. & G.' ∴ ∴ *LANTERN SLIDE MATERIALS.*

THE 'N. & G.' RECTANGULAR MASKS.

(Black one side and white other side.)

THESE Masks are made from paper expressly manu-factured for the purpose; it is hot pressed between silvered plates, thereby obviating roughness, pinholes, and dust. Each mask is CUT BY HAND, thus ensuring perfectly clean edges.

The corners are cut square, and the openings are particularly suitable for slides made by reduction in the Camera.

For ARTISTIC Lantern Slides these masks are indispensable.

ACTUAL SIZE OF OPENING.

No. 1	$2\frac{3}{4} \times 2\frac{3}{4}$	No. 4	$2\frac{1}{16} \times 2\frac{1}{16}$
,, 2	$2\frac{3}{4} \times 2\frac{1}{2}$	,, 5	$2\frac{1}{16} \times 1\frac{13}{16}$
,, 3	$2\frac{3}{4} \times 2\frac{1}{4}$	,, 6	$2\frac{1}{16} \times 1\frac{11}{16}$

Price **1/-** per box of 100 masks, all one shape or assorted.
Postage: 1 box, 2d.; 6 boxes, 3d.

BINDING STRIPS,

Of great strength and double gummed, 14 in. long, and the required width.
Price **1/-** per box of 150 strips. Postage 2d.

ADHESIVE 'SPOT' LABELS. (White or Black.

6d. per box of 1000.

TRANSPARENT DEVELOPING DISHES FOR LANTERN SLIDES.

Xylonite ... ... **8d.** each. | Glass ... ... **6d.** each.

COVER GLASSES.

Specially selected, extra thin sheet glass.
8d. per dozen; **7s. 6d.** per gross.

MASK PAPER.

Purple-black, glazed finish. The finest Mask Paper manufactured; thick and absolutely free from pinholes.

1 sheet demy ($22\frac{1}{2} \times 17\frac{1}{2}$) ... ... **2d.**
6 sheets ,, ,, ... **9d.**

NEWMAN & GUARDIA, Limited, are AGENTS for Zeiss' Photographic Lenses.

ZEISS SATZ-ANASTIGMAT LENSES.

GUARANTEED JENA-MADE, AND AS USED IN THE 'N. & G.' SPECIAL B CAMERAS.

SERIES VIIa. *f*.6.3.



These Lenses are the latest production of the famous Jena Factory. They are the most perfect Anastigmatic Lenses, and have very *great covering power*. In addition to the same *extreme aperture* of *f*.6.3, which has made the Zeiss Series II. so popular, they offer the advantage that their *separate Combinations can be used as Single Lenses*. Each Combination is composed of four elements cemented together, and each separate Combination forms by itself a perfectly corrected Anastigmatic Lens, working at *f*.12.5. Further, in the Satz-Anastigmats, combinations of *different focal lengths* can be used, so that a Satz may be made to provide *three* lenses of different foci in one.

No.	Focus of Single Lenses. Front.	Focus of Single Lenses. Back.	Combined Focus.	Full Aperture.	Plate Covered, Full Aperture.	Price with Iris Diaphragm. Brass Mount.
	In.	In.	In.		In.	
1	7½	7½	4¾	*f*.6.3	3¼ × 3¼	£7 5 0
2	9	7½	4¾	*f*.7	4¼ × 3¼	7 15 0
3	11½	7½	5	*f*.7.7	5 × 4	8 10 0
4	9	9	5	*f*.6.3	5 × 4	8 5 0
5	11½	9	5⅝	*f*.7	6½ × 4¼	9 0 0
6	14	9	6¼	*f*.7.7	6½ × 4¾	10 0 0
7	11½	11½	6¾	*f*.6.3	7¼ × 4¾	9 15 0
8	14	11½	7	*f*.7	7½ × 5	10 15 0
9	16½	11½	7¼	*f*.7.7	8¼ × 5	12 10 0
10	14	14	8	*f*.6.3	8¼ × 5	11 15 0

Pairing Lenses for Stereoscopic and Twin-Lens Work, 8/- per set extra.
Double Pairing, 16/- per set extra.

We always keep the numbers generally used in the 'N. & G.' Cameras in stock ready for delivery. Other numbers are imported direct from Jena without extra charge.

FULL LISTS FREE ON APPLICATION.

For particulars of other Lenses specially selected for Hand Camera Work, see the 'N. & G.' Complete Catalogue. Price 1/3 post free.



— CONTENTS —

OF THE

Abridged Catalogue.

	PAGE
COMPLETE CATALOGUE (Ad.)	108
TERMS, &c.	109
THE 'N. & G.' CAMERAS—	
GENERAL LIST	113
GENERAL SPECIFICATION	114
PATTERN A	114
PATTERN B	115
SPECIAL PATTERN B	116
PATTERN C	118
HALF-PLATE PATTERN	119
TWIN LENS PATTERN.	120
STEREOSCOPIC PATTERN	121
'EIFFEL' STAND	122
TRIPOD SCREW	122
CARRYING STRAPS	122
TELEMETER	123
ISOCHROMATIC SCREENS.	124
FINDERS	124
CHANGING BOXES	125
RE-FILL BOXES	127
CHANGING BAG	127
ENLARGING CAMERA	128
REDUCING CAMERA	130
¼ TO ¼ ENLARGER	131
BLIND SHUTTER	132
HIGH SPEED SHUTTER	133
HAND CAMERA PLATES.	134
DEVELOPER	135
FORESTER'S BACKING	135
PRINT TRIMMER	135
LANTERN SLIDE MATERIALS	136
ZEISS' LENSES	137

[*See preceding pages.*

Telegraphic Address: 'SODA, GLASGOW.'] [Telephone No. 140.

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180 to 186 SAUCHIEHALL ST., GLASGOW.

OUR NEW PHOTOGRAPHIC LIST AND GUIDE

Now in the Press and will be Ready Early in January.
It will contain everything new in the Trade Up-to-Date.

IT WILL TELL YOU—What goods to buy—How to work with them—What to pay for them—Where to get them.

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CAMERAS.

STUDIO CAMERAS.—'THE HANDY.'

Cheap and Serviceable, with Cloth Bellows and all the Latest Improvements.
Whole-plate, **£5 10s.** (draws from 5 to 28 ins.); 12×10, **£7 10s.** (draws from 6 to 38 ins.); 15×12, **£9 10s.** (draws from 6½ to 48 ins.)

THE 'STAR' STUDIO CAMERA.

Mahogany. Fitted with all the Latest Improvements and 2 Slides, with folding base-board.
Half-plate, **£5**; Whole, **£6**; 10×10, **£6 12s.**; 12×12, **£7 10s.**; 15×15, **£11 10s.**

THE 'PRINCE' STUDIO CAMERA.

MAHOGANY, WITH ALL THE LATEST IMPROVEMENTS.

6½×6½, for 1 Cabinet and 2 Carte-de-Visites	**£4 10 0**
8½×8½, for Whole-plate, Promenades, and the above	**6 10 0**
10×10, for 10×8 Plate, Boudoirs, and the above	**7 0 0**
12×12, for 12×10 Plate and all smaller sizes	**8 0 0**

NEW AMERICAN STUDIO.

Whole-plate ... **£8 15s.**; 10×8 ... **£10**; 12×10 ... **£13 10s.**

SALOON STUDIO CAMERA AND STAND.

The Camera is fitted with full-size focussing screen and one curtain slide, with set of carriers down to ¼-plate, and two smaller slides, one repeating, and extra screen and adapter for same. Attached to the stand is a musical box, which will be found serviceable in attracting the attention of children. The whole is finished in the finest style, and forms an elegant and attractive piece of furniture, as well as being the most useful Camera ever introduced.

PRICES.

Extension.		Extension.	
10×8 ... 3 ft. 8 in. ...	**£24**	20×20 ... 5 ft. 4 in. ...	**£40**
12×10 ... 4 ,, 2 ,, ...	**25**	24×24 ... 6 ,, 4 ,, ...	**45**
15×12 ... 5 ,, 0 ,, ...	**27**	*Prices for Larger Size on Application.*	

STUDIO STANDS.

OUR AUTOMATIC STAND.—Small size, **£4 10**; Large, **£6.**
AMERICAN SEMI-CENTENIAL.—It lowers to 13 inches from floor, **£6.**
NEW MAGIC STAND.—Rack adjustments, **£1 15.**

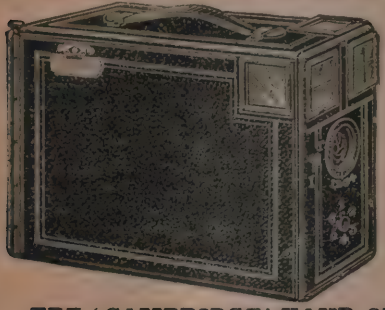
[*See following pages.*

GEORGE MASON & CO., GLASGOW.

SPECIAL LINES IN OUT-DOOR AND HAND CAMERAS.

THE 'UNIVERSAL' LANDSCAPE Half-Plate CAMERA, with 3 Double Slides, Combination Lens. Price **£3.** Three-fold Tripod, 10 6 extra.

OUR GEM SET, 70s. Half-plate Camera, 1 Double Slide (book form), Swing and Reversing Back, Rising Front and Double Extension Leather Bellows, with Wide-angle Arrangement, R.R. Lens, Iris Diaphragm, working at F/8, T.P. Shutter, with 3-fold Tripod, all attached for speedy working. Extra Book-form Slides, **10s. 6d.** each.



THE LATEST IN HAND CAMERAS.

OUR IXL

Carries 12 Quarter-plates, has 2 Brilliant View Finders, with Warranted Lens, Iris Diaphragm, Time and Instantaneous Shutter, Automatic Indicator, also Speed Indicator, Fixed Focus from 12 feet.

The Handiest and Cheapest Magazine Camera in the Market.

COMPLETE for 42s.

THE 'CAMBRIDGE' HAND OR STAND CAMERA is the most compact Camera in the market. It has a rising and falling front, swing-back, a Thornton-Pickard time and instantaneous shutter, with speed indicator. An attachment is fixed to the focussing screen, which does away with the use of a focussing cloth. Complete, with three double dark slides. Price, with a French Rapid Rectilinear Lens and Iris Diaphragm **£4 10s.** With a Taylor, Taylor, & Hobson Lens, **£5 10s.** With a Goerz Lens, **£9.**

THE 'I. X. L.' SET.—This Camera is made of the very best well-seasoned mahogany, and is of the finest workmanship. It is fitted with three double dark slides, rectilinear lens, Iris diaphragms, instantaneous shutter, tripod stand. Complete, in waterproof case, **£7 5s.**

OUT-DOOR CAMERAS

THAT GO INTO SMALL SPACES, WITH ALL THE LATEST MOVEMENTS.

'POPULAR,' with three double dark slides. ½-plate, **£4 10s.**; whole-plate, **£6**; 10 × 8, **£7 10s.**; 12 × 10, **£9**; 15 × 12, **£11.**

'CRITERION,' with three double dark slides. ½-plate, **£6**; whole-plate, **£7 5s.**; 10 × 8, **£8 15s.**; 12 × 10, **£10 10s.**; 15 × 12, **£12 15s.**

'MARGUERITE,' with three double dark slides. ½-plate, **£5 10s.**; whole-plate, **£6 15s.**

OUR 'LADIES' CAMERA.—The lightest Field Camera made. ½-plate, with three double slides, **£5 10s.** Turntable and Stand for ½-plate, 25s. extra. (List of all sizes sent on application.)

THE NEW 'FRENA' CAMERA, No. 00, Memorandum size, taking 3¼ × 2¼ pictures holds 40 films, **£2 18s. 8d.** No. 0 'FRENA,' with Rapid Rectilinear Lens (holds 40 films), **£5 5s.** (Book of instructions with each Camera.)

KODAKS.—All Patterns stocked, from the Guinea Pocket Form to the New No. 4 Cartridge at **£5 5s.**

Tourist Field Glass, magnifying 6, 8, and 11 times. Price **15s., 21s.,** and **35s.,** complete in Case.

Lecturer's Lanterns, Russian iron Lanterns, complete in box, from **£1 10** to **£4 10.**

A Large Selection of all Makes of Hand Cameras Stocked, or can be procured on the shortest notice

SEND FOR OUR HAND CAMERA LIST, FULLY ILLUSTRATED, FREE ON APPLICATION.

GEORGE MASON & CO., GLASGOW.

LEADING LINES IN LENSES.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

SINGLE VIEW LENSES.—Double Achromatic, Iris Diaphragms. ¼-plate, **8/-**; ½-plate, **12/6**; ¼-plate, **19/-**.

(Fig. 1.) **SINGLE MENISCUS LANDSCAPE.**—Full aperture, *f*/11.—4¼×3¼, 5-in. focus, **17/6**; 6½×4¾, 8½-in. focus, **21/-**; 8½×6½, 12½in. focus, **35/-**; 10×8, 14-in. focus, **37/6**.

THE CHOROSCOPE SINGLE LENS.—With Shutter, specially suitable for Hand Cameras. ¼-plate, **12/6**; ½-plate, **15/-**; ¼-plate, **25/-**.

(Fig. 2.) **RAPID RECTILINEAR.**—Iris or Waterhouse Diaphragms, warranted. 5×4, **20/-**; ½-plate, **24/-**; ¼-plate, **40/-**; 10×8, **52/-**; 12×10, **72/-**; 15×12, **98/-**.

(Fig. 3.) **WIDE-ANGLE RAPID RECTILINEAR.**—Working aperture, F/16. Angle of View from 100° to 110°. 7×5, 4½-inch focus, **32/-**; 9×7, 6-inch focus, **48/-**; 12×10, 8-inch focus, **64/**; 16×12, 12-inch focus, **104/-**.

EXTRA RAPID RECTILINEAR.—Mounted in Aluminium, warranted; F/8. 5×4, **33/-** 7×5, **38/-**; 9×7, **54/-**; 10×8, **87/-**; 12×10, **115/-**.

MASON'S SNAP-SHOT LENS (Iris Diaphragm).—Brilliant image, free from distortion. Made specially for Hand Cameras. Fixed focus when adjusted for objects at 25 ft. Price **30s.** each. Paired for Stereo Work, **62/-** per pair.

HAND CAMERA LENSES (Fig. 3).—Detective, single, full aperture *f*/11. Covers ¼-plate sharp to the edge, 5-in. focus, rotary stop. Price **20/-**.

(Fig. 4.) PORTRAIT LENSES (FRENCH) of fine quality, made with English glass, English patterns.—Carte, **80/-**; Cabinet, **100/-**; Whole-plate, **160/-**.

PORTRAIT LENSES (FRENCH), cheap quality, warranted.—Carte, **25/-** Cabinet, **50/-**: Whole-plate, **105/-**.

RAPID EURYSCOPE (*f*6).—Jena Glass. A Rectilinear Portrait Lens for Studio, Instantaneous Subjects, and Outdoor Groups. 5×4, **37/-**; 7×5, **85/-**; 9×7, **100/-**.

PANORTHOSCOPIC LENS WITH TELE-OBJECTIVE.—Its utility for Military Observations, Sea Views, Mountainous Scenery, and Architectural Subjects is universally approved of. For ½-plates, **104/-**; ¼-plates, **128/-**.

This Tele-Photo Objective may also be used for Portraiture (⅛-life size), modelling splendidly without retouching.

WRAY'S PLATYSTIGMAT.
GOERZ' DOUBLE ANASTIGMATIC LENSES.
THE CONVERTIBLE ANASTIGMAT (ZEISS PATENT).
THE DALLMEYER STIGMATIC LENS.
THE DALLMEYER-BERGHEIM LENS.
TAYLOR, TAYLOR & HOBSON'S COOKE LENS.

We are Agents for and Stock Lenses by all the best makers—Ross, Dallmeyer, Taylor, Wray, Swift, Zeiss, Suter, Clement & Gilmer, *&c., &c.*

Lists and Particulars of all the above makes of Lenses to be had on Application.

GEORGE MASON & CO., GLASGOW.



Designed by the Inventor as an Outdoor Appliance, whereby Portraits and Groups can be Photographed in the Open with all the advantages of controlling Light and Shade as in the Studio. Comes as a boon to Amateurs and Professionals alike.

For speedy erection it is a marvel—only the work of a minute.
For lightness and portability it stands unrivalled.
For combination of movement for the producing of various effects it is complete.

We now supply the **AUTO-ACETYLENE GENERATOR** Improved Pattern, 1897.

All improvements protected. This is without doubt the most convenient form for Photographers, Scientists, and for Lantern Projection. Also large sizes for House Lighting. *This Generator is Absolutely Safe, no Danger, no Risk.* Press notices and further particulars on application.

Pattern B—For PHOTOGRAPHIC STUDIOS (Single Generator).

Size—	II.	III.
Capacity of Gas Holder, in cubic feet	2½	5
Charge of Carbide, in lbs.	4	6

Size—	II.	III.
24 Burners supplied for 1 hour.	1½ hour.	
Price	**£6**	**£7 10s**
Strong Wooden Seat, extra	**20s.**	**27s.**

These Generators are specially designed for Photographers, as they are intended to give a *large* supply of acetylene for a short time. In conjunction with one of our Acetylene Photographing Outfits, excellent negatives can be obtained with from 1 second's exposure.

Prices of PHOTOGRAPHIC OUTFITS.—No. 2, 24 burners, **£2 10s.** No. 3, 50 burners, **£4.** Complete with Reflectors and Stand. Adjustable in every way.

Pattern C—LANTERN.—Capacity of Gas Holder, in cubic feet, ¼. Charge of Carbide, in lbs., 1½. Will maintain 2 Burners for 3½ hours. Price, packed in case, **£2 2s.** SPECIAL LANTERN FITTINGS, with 2 Burners, **7s. 6d.**

This pattern 'Auto' has been designed with a view to portability, without sacrificing any of the advantages of our system. We have now supplied a very large number of this pattern, and they continue to give complete satisfaction. It is acknowledged to be undoubtedly the best portable Generator on the market.

Pattern D—SPECIAL SCIENCE (on Stand).—As supplied to the Royal Naval College, Greenwich.—Capacity of Gas Holder, in cubic feet, 1¼. Price **£3 10s.** The above price includes an Iron Stand.

For Science Lectures and use in Laboratories where a small supply of Acetylene is often required at a moment's notice, our Special Science Pattern, as supplied to the Royal Naval College, Greenwich, will be found to meet every requirement at a very moderate price.

GEORGE MASON & CO., GLASGOW.

BEST QUALITY. **MOUNTS.** LOWEST PRICES.

PATENT MOUNTS for Enamel Prints. For slipping in. In grey board with silver line; white board, plate sunk; and cream board with chocolate line.

Cream board with chocolate line—

¼	5×4	½	7×5	1		¼	5×4	½	7×5	1
5/-	5/-	7/-	7/6	12/6 per 100		-/9	-/9	1/-	1/-	1/6 per doz.

White board, plate sunk—

¼, 3/8 ½, 5/6 1, 9/- per 100 | ¼, -/6 ½, -/9 1, 1/6 per doz.

Grey board, silver line—

¼, 5/-; 5×4, 7/3; ½, 7/6; 1, 12/- | ¼, -/9; 5×4, 1/-; ½, 1/-; 1, 1/6

IMPORTANT ANNOUNCEMENT.—For some time certain makers have been introducing low-priced, common, soft, spongy mounting-boards. To meet the demand for a cheap reliable mount, our factory have succeeded in placing on the market a hard, smooth-surface, stout mount, in the usual styles: India tint, India tint plate-mark, Oxford line and plate-marked with paste-down India tint. Where a really good cheap mount is wanted this will meet the requirements of the profession.

SPECIAL CHEAP QUALITY.

Size of Tint or Line.	No. of Mount.	Indian Tint. 100.	Indian Tint. 1000.	No. of Mount.	Oxford Line. 100.	Oxford Line. 1000.	No. of Mount.	Plate-sunk with Tint. 100.	Plate-sunk with Tint. 1000.	No. of Mount.	Plate-mark, Paste down Tint. 100.	Plate-mark, Paste down Tint. 1000.	No. of Mount.	Granulated, with Paste-down Tint. 100.	Granulated, with Paste-down Tint. 1000.
5½×3½	220	2/-	19/6	320	2/-	19/6	820	2/6	24/-	920	3/3	30/-	1320	3/6	33/-
6×4½	222	2/6	23/-	322	2/6	23/-	822	2/10	27/-	922	3/9	35/-	1322	4/-	38/-
7×5	224	3/3	31/-	324	3/3	34/-	824	3/9	35/-	924	5/-	47/-	1324	5/3	51/-
9×7	226	4/9	45/-	326	4/9	45/-	826	5/6	52/-	926	7/-	68/-	1326	7/9	73/-
10×8	227	6/9	65/6	327	6/9	65/6	827	8/-	75/-	927	10/-	96/-	1327	10/9	103/-
10½×8½	228	7/6	68/-	328	7/6	68/-	828	8/9	78/-	928	11/6	102/-	1328	12/6	112/-
12×10	229	12/-	113/-	329	12/-	113/-	829	13/6	128/-	929	15/6	145/-	1329	16/6	155/-
14×11	230	16/6	157/6	330	16/6	157/6	830	18/-	175/-	930	21/-	195/-	1330	22/6	215/-
15½×12	231	19/6	175/-	331	19/6	175/-	831	22/6	195/-	931	24/6	215/-	1331	27/6	235/-
18×14	232	22/6	200/-	332	22/6	200/-	832	25/-	220/-	932	29/-	250/-	1332	31/-	275/-

Most of above in stock. Larger sizes to order only. The larger sizes can be had extra thick at an advance in price.

PLATE MARKED MOUNTS, with India Tint pasted on. Good quality. White board, Cream tint. Grey board, Cream tint.

Board... ...	8½×6½	9½×8	10×8	12×10	15×12	18×14
Tint	5×4	6½×5½	7×5	9×7	10½×8½	12×10
Price per 100		5/6	7/-	9/3	14/-	21/-
Board... ...	20×16	21½×17¼		25×19	29×23	33×26
Tint	14×11	15×12		18×14	21×17	25×19
Price per 100	26/-	30/-		35/-	12/- doz.	18/- doz.

GRANULATED PLATE SUNK MOUNTS. Newest Designs. Best Quality.

Size of board.	Size of tint.	Per 100.	Size of board.	Size of tint.	Per 100.
8×6 ...	3½×3½ ...	6/-	12½×9½ ...	9½×7 ...	11/6
9×7 ...	5×4 ...	7/3	14½×10½ ...	10×8 ...	16/-
10×8 ...	6½×5 ...	8/6	16×12 ...	10½×8½ ...	21/-
10½×8½ ...	7×5½ ...	9/6	18×14½ ...	12½×10½ ...	30/-
12×9 ...	7×5½ ...	11/6	20×14½ ...	12½×10½ ...	33/-
12½×9½ ...	9×7 ...	11/6	23×19 ...	14½×11½ ...	42/-

GEORGE MASON & CO., GLASGOW.

MOUNTS (*Continued*).

GRANULATED PLATE SUNK MOUNTS. Good quality. . Grey boards, cream tint.

Size of board.	Size of tint.	Per 100.	Size of board.	Size of tint.	Per 100.
8 × 6 ...	5¼ × 3¾ ...	5/3	14 × 11½ ...	10 × 8 ...	14/-
8½ × 6½ ...	5 × 4 ...	5/6	15 × 12 ...	10¼ × 8¼ ...	16/-
8½ × 6½ ...	6 × 4¼ ...	5/6	18 × 14 ...	12 × 10 ...	23/-
9½ × 8 ...	6½ × 5¼ ...	7/-	20 × 16 ...	14 × 11 ...	36/-
10 × 8 ...	7 × 5 ...	7/3	21½ × 17¼ ...	15 × 12 ...	38/-
12 × 10 ...	9 × 7 ...	10/-	25 × 19 ...	18 × 14 ...	50/-

PLATINOTYPE MOUNTS. Plate sunk, pasted tint, gold bevelled. (*a*) White with cream tint; (*d*) Grey with cream tint.

	Size of board.	Size of tint.	Per 100.
C.-D.-V.	6½ × 4½	4⅝ × 3	5/6
Cabinet	9 × 6½	(6 sheet) 6½ × 4½	9/6
,, ...	,,	(8 sheet) ,, ...	12/-

All other sizes up to 20 × 16 supplied to order. Any size of board and tint can be made

C. D. V., CABINET, PORTRAIT, AND VIEW MOUNTS, Bevelled and other edges, Gold and all Styles of Stamping, Lithographed Designs, Newest Styles. See Supplement to List or Special Prices on application.

To meet the demand for a cheap quality we have introduced a good smooth board, in several tints, Cream, Grey, Pale Blue, Pink and Grey Bristol, and Cream, Olive, and Black Enamel, supplied in all styles of Edges, Printing, and Stamping. Prices and samples on application. State quantity and style of Mount and finishing.

'PEARL' MOUNTING BOARD.—The **'Pearl Board'** is on one side a rich Cream Tint, the other side White. Both sides have an *extra superfine* finish, and serve at once for a toned or a white board.

THICK AND STRONG—ONCE USED ALWAYS USED.

8 × 6, **6/6** 10 × 8, **10/-** 12 × 10, **14/-6** 15 × 12, **22/-** 19 × 14, **32/-** 26 × 19, **54/-** 29 × 23, **72/-** per gross.

THE 'SILVER GREY' BOARD has a delicate grey tint on both sides. It is extra thick—best superfine quality—hard, smooth surface. Specially suited for PLATINOTYPE and BROMIDE work.

A BETTER BOARD CANNOT BE HAD FOR ANY MONEY.

10 × 8, **10/-** 12 × 10, **14/6** 15 × 12, **22/-** 19 × 14, **32/-** 26 × 19, **54/-** 29 × 23, **72/-** per gross.

A special line in eight sheet boards for rough mounting, white both sides, or white and toned, 23 × 17, **20/-** per gross. Other sizes in proportion.

LINED MOUNTS.—Special, for Views or Groups. Superfine quality, with double chocolate line.

Board... ...	8½ × 6½	8½ × 6½	10 × 8	12 × 10	14 × 11½
Line	5 × 4	6 × 4¼	7 × 5	9 × 7	10 × 8
Price per 100	4/-	4/-	5/6	9/-	12/-
Board... ...	15 × 12	18 × 14	20 × 16	21½ × 17½	25 × 19
Line	10½ × 8¼	12 × 10	14 × 11	15 × 12	18 × 14
Price per 100	14/-	18/-	28/-	38/-	46/-

GEORGE MASON & CO., GLASGOW.

OXFORD LINED MOUNTS, for Views and Groups. Cream board, chocolate lines, fancy corners.

Board... ...	10×8	12×10	14×11	15 ×12	18×14	20×16	21×17	25×19
Line	7×5	9× 7	10× 8	10½×8¼	12×10	14×11	15×12	18×14
Price per 100	4/6	6/-	9/9	11/6	18/6	25/6	27/-	31/-

INDIA TINTED MOUNTS.—White, with neutral grey tint.

Board... ...	10×8	12×10	15×12	18×14	20×16	21×17	25×19
Tint	7×5	9× 7	10½×8¼	12×10	14×11	15×12	18×14
Price per 100	4/6	6/-	11/6	18/6	25/6	27/-	31/-
	The same Mount, with plate-sunk mark :—						
Price per 100	5/6	8/6	14/-	22/-	29/-	31/-	40/-

NEW MANTELLO MOUNTS.—All sizes to order, in Grey, Bristol, or White Enamel with plain edges, bevel edges, crenate edges, or gold bevelled edges.

	Plain Edge.			Crenate Plain Bevel.	
	Bristol.	Enamel.		Bristol.	Enamel.
Prim Midget, per 1000... ...	11/-	12/6	.....	22/6	24/-
C.-D.-V. ,, ...	18/-	21/-	.....	33/-	36/-
Cabinet, ,, ...	38/-	46/-	.....	58/-	66/-

CHRISTMAS AND NEW YEAR MOUNTS in great variety, specially designed for photographs, new designs as introduced. *Sample packet at rates for quantity.*

MUSICAL BOXES, fitted with Twelve Tunes, on table stand complete.—Boxes 7½×6½, on table, 38/-; 10½×8. 58/-; 12×10, 70/-; 17×13, 130/-.

BOXES OF PLANTS, six Plants in box, at 10/6, 13/6, and 20/- per box.

BOXES OF SPRAYS, six Sprays in box, 7/6.

FURNITURE AND ACCESSORIES.

Bird Cage and Stand, 5 ft. high, 35/- **The Cottage,** 5 ft. wide, 45/-
Oak Dolphin Table, 75/- **Oak Wolsey Chair,** 95/- **Rustic Stile, 17/6.**
Gateway with Pillars, 30/- Oak Writing Cabinet, £9 10s.
Herkomer Table, 40/- Circular Balustrade, 5 pillars, 35/- **Tree Stump, 21/-**
Garden Seat, Sandstone, 60/- **Rustic Flower Stands, 2/6 to 30/-**
Rustic Tables, Japanese, 5/- to 40/- **Oak Hall Seats and Tables,**
Posing Chairs, 12/6; with 2 backs, 75/-; 4 backs, **£7 10s.**
New Outdoor Combination Old Garden Wall and Seat, 8 pieces, **£7 10s.**
New Gateway Combination for Children, 7 pieces, **£3 15s.**
Reversible Wall and Gateway, 36in. high×36in. long, the wall, and length over all 6 ft. 6 in., 50/-
New Cottage Front, 7½ ft. high, 6 ft. broad, folding windows, **£3 15s.**
Overmantle and Fireplace, beautifully designed, in *papier mache,* 7 ft. high×4 ft. broad, **£4 4s.**
Marlborough Column and Base, richly designed. Column, 4 ft. high×11 in. broad. Base, 40 in. high×24 in. broad. **£4 10s.**
New Posing Chair for Vignettes, upholstered in Figured Plush, 12/6.
New Grouping Stools, upholstered in Figured Plush, 16in. 5/6, 26 in. 10/-
Sprays, Vine, 2/-; Flowers, set of 6, 7/6, 10/6, 13/6, and 21/-.
Grass Mats, 6 ft.×30 in., 5/- **Papier Mache Rocks,** large variety, from 2/6.

We have photographs, lithographs, or designs in most cases, of Furniture and Accessories, which we will be glad to send on for inspection to any one so desiring.

GEORGE MASON & CO., GLASGOW.

BACKGROUNDS.

New English Grounds, painted in a new medium, which has all the advantages of Oil, together with the beauty of tone of the finest Distemper. Exterior and Interior, 8×8, **40/-**; 14×8, with continuous floorcloth, **50/-** 8×5 Continuous, for Children, **25/-** 7×5, for ¾-length work, **18/6.** 48×40, for Heads, from **7/6.** Graduated Grounds: 7×5, **15/-**; 8×6, **18/-**; 8×8, **25/-.** Variety of New Cheap Grounds, 4 ft. 8 in. × 3 ft. 6 in., 2 on a frame, for **21/-.**

Our New Outdoor Scenic Background, and Continuous Foreground, 16 ft. × 10 ft., the foreground is suitable as a track for Cyclists and for outdoor sport, **65/-**

American Grounds—8×8, from **45/-**; 14×8, continuous, from **70/-.**

New Burlaps, painted in Colours, giving strong, rich effects—8×8, **50/-**; 14×8, continuous, **85/-.** **Universal Floorcloths,** separate, **42/-.**

Italian Grounds, 8×8, **60/-.** **Moselle Grounds,** 8×8, **50/-.** Cheap Grounds, 8×8, from **25/-.**

Seavey Grounds, in all the latest Designs. Interior and Exterior, ordinary 8×8, Continuous 14×8, from **£3 12s.** to **£5,** according to design.

All sizes and designs painted to order, either in Oil or Distemper. Quotations given.

Plain Cloth Grounds, in pale blue, green, and grey, at the following sizes and prices :—

50×40	60×40	70×40	70×60	72×72	90×72	108×92	108×96	120×96	132×96	144×96
2/8	3/-	3/4	4/6	5/6	6/8	7/10	12/-	13/6	15/-	16/6

Photographs and Patterns sent when desired.

OPALINE GOODS. Plush Blocks, Bevelled Glasses, Backs and Boxes. In every style. If interested in this class of goods it would pay you to send for our Detailed Price List before buying.

OUR NEW TRANSPARENT ENVELOPES, for protecting photographs. In White, Pale Pink, Dark Pink, or Satin. All sizes to order. C.-D.-V., **2/3**; Cabinets, **3/6** per 1000.

PARCHMENT ENVELOPES.—C.-D.-V., **2/3**; Cabinets, **3/6** per 1000.

TISSUE PAPERS, for Protecting Photographs. — **New Ornamented Design Tissues,** in 4 designs, assorted: C.-D.-V., **1/6**; Cabinet, **3/-** per 1000. **Plain Tissues,** White or Pink: C.D.-V., **-/8**; Cabinet, **1/3** per 1000.

PADS FOR PRINTING-FRAMES. — Our new strong twilled cloth, rubber-coated on one side; specially adapted for Gelatine and Collodion paper. ½-plate, per doz, **1/2**; per gross, **13/-.** ¼-plate, per doz., **2/4**; per gross, **26/-.** Pads, white felt, thick—¼, **2/6**; ½, **3/6**; ¾, **5/6**; 1, **9/6**; 10×8, **14/6**; 12×10, **18/-**; 15×12, **24/-** per dozen. **9/6** per yard, width 28 inches.

PORCELAIN TRAYS (Second Quality).—Special cheap lines. Somewhat twisted in firing. Good for washing, fixing, &c. We usually have stock of most sizes in deep and shallow. For prices see our **Monthly Journal.**

SEE OUR MONTHLY JOURNAL for Cheap Lines, Odd Lines, and Job Lines. Post free.

BRASS RIMS, Plain and Fancy.—Only supplied in quantity. Lowest prices. Special terms for large buyers.

COLLODIO-CHLORIDE PAPERS. GELATINO-CHLORIDE PAPERS. ALBUMENIZED PAPERS. All Brands. Every New Paper on Introduction.

ENAMELLING GELATINE 'COIGNETS' (Gold medal), **1/8** per lb.

ENAMEL COLLODION, our own, **9/-** Winchester, **2/9** a pint.

THINNING SOLUTION, our own, **8/-** Winchester, **2/-** a pint.

CASWELL BACKGROUND STAND, fitted for 10 grounds. —8×8, with one Roller, **£6 5/-**; extra Rollers, **11/-** each. 10×8, with one Roller **£6 10/-**; extra Rollers, **12/-** each.

GLOBE ENAMELLERS.—Sizes, 10 in., 15 in., 20 in., 25 in.

GEORGE MASON & CO., Sauchiehall St., Glasgow.

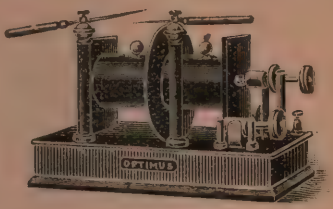
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[*See preceding pages.*

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PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

RÖNTGEN'S X RAY PHOTOGRAPHY



"OPTIMUS" INDUCTION COILS

Best London made, giving sparks as follows:

Inch Spark	2	3	4	5	6	8	10	12
Price ...	£7	£10	£12	£14	£17	£25	£30	£36

Larger Coils to Order.

SHADOGRAPHS on Paper or for Magic Lantern, 1/-

FOCUS TUBES. RESULTS GUARANTEED. **25/-**



PORTABLE ACCUMULATORS.

Owing to their constancy and low internal resistance, accumulators have proved themselves to be the best for Röntgen work, for medical cautery, &c.

4 cells 18 ampere hours (in enclosed cabinet) ... 50/-
6 „ 30 „ „ 120/-

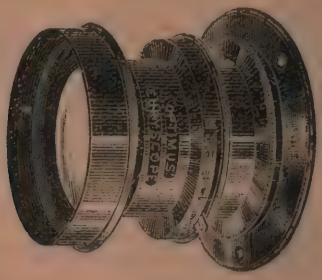
INTENSITY COILS: *How Made and How Used*, Stiff Board, 1/-

Contains full instructions for the making and working of Induction Coils and Batteries.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



"OPTIMUS" EXTRA RAPID EURYSCOPE.

Large Diametor (Double). The aperture is F.6. The lenses are of special optical glass, constructed with the nicest precision of curvatures, so maintaining good marginal definition, coupled with the most Extreme Rapidity.

Brass Mounts and Waterhouse Diaphragms.

To cover	5 × 4	6 × 5	7 × 5	8 × 5	9 × 7	10 × 8	12 × 10
Equiv. Focus	5½	6¾	8¾	10	12	14	18 inches
	63/-	78/-	94/6	110/-	126/-	220/-	380/-

Brass Mounts and Iris Diaphragms.

73/- 89/- 105/- 122/- 138/- 234/- 400/-

Aluminium Mounts, with Iris Diaphragms.

83/- 100/- 120/- 137/- 155/- 254/- 430/-

"'OPTIMUS' LENS.—I have taken trains going at 30 miles an hour, and think the lenses perfect for rapidity and definition.—E. J. WALL." *Amateur Photographer.*

"We now turn to the 'OPTIMUS' RAPID EURYSCOPE, manufactured by Perken, Son & Rayment. With its full aperture of 1¾ in. (its equivalent focus being 11 in.) it defines with EXTREME BRILLIANCY, and when used with a stop it easily covers a 10 by 8 plate to the corners, which is larger than that engraved on the mount as its possibility. Working as it does with such a LARGE APERTURE (F/6 approx.) it serves as a Portrait and Group Lens, as well as a landscape and copying objective. There is no doubt of its proving a most USEFUL LENS.—J. TRAILL TAYLOR." — *British Journal of Photography.*

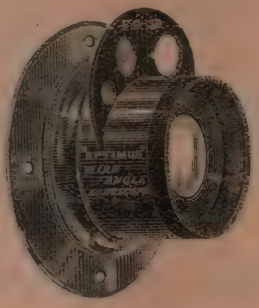
"'OPTIMUS' EURYSCOPE.—When in your establishment you kindly lent me one of your 7 × 5. I like the lens so well I do not want to part with it."—CHAPMAN JONES, F.I.C., F.C.S.

"'OPTIMUS' EURYSCOPE.—This lens is of extra large diameter; the aperture being F/6, and while admitting of the most rapid exposures, gives fine marginal definition. We have obtained with it excellent portraits in an ordinary sitting-room. The lens is a most useful one all round."—T. C. HEPWORTH.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden, Holborn Viaduct, LONDON



"OPTIMUS" WIDE ANGLE EURYSCOPE.

Wide Angle Euryscope (Double), F/9·50. This aperture is exceedingly open for wide angle work. The definition, however, is in no way sacrificed, as the curvatures are most perfectly accurate, and the minute detail in architectural and interior subjects is rendered with the maximum of crispness and a total absence of distortion.

Mounted in Brass, with Rotating Stops.

To cover	5 × 4	7 × 5	9 × 7	10 × 8	12 × 10
	63/-	94/6	126/-	220/-	380/-

Mounted in Brass, with Iris Diaphragms.

73/-	105/-	138/-	234/-	400/-

Mounted in Aluminium, with Iris Diaphragms.

83/-	118/-	155/-	254/-	430/-

"'OPTIMUS' EURYSCOPE LENS.—I have taken trains going at 30 miles an hour, and think the lenses PERFECT for RAPIDITY and DEFINITION.—E. J. WALL."—*Amateur Photographer.*

"OPTIMUS' EURYSCOPE.—This lens is of extra large diameter; the aperture being F/6, and while admitting of the MOST RAPID exposures, gives FINE marginal DEFINITION. We have obtained with it excellent portraits in an ordinary sitting-room. The lens is a most useful one all round."—T. C. HEPWORTH, F.C.S.

"If E. G. E. wants the finest lens in the market he cannot do better than get the 'OPTIMUS.'—Professor DE FREE."—*Amateur Photographer.*

"'OPTIMUS' EURYSCOPE.—I am much pleased with the 9 × 7 received last week. It covers 12 × 10, and gives splendid definition. For a good, useful, all-round lens I consider it perfect."—E. BRIGHTMAN, Hon. Sec. Bristol and West of England A.P.A.

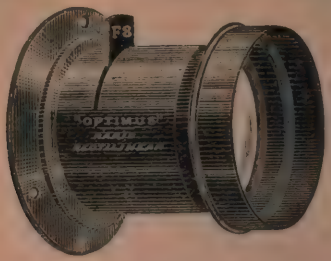
"As I have often said before, I consider these lenses unequalled.—E. J. WALL."—*Amateur Photographer.*

"I have tried the 7 × 5 'OPTIMUS' Euryscope. It is a very satisfactory lens, and covers the *whole plate* for interiors with F/16; being able to work at F/6 makes it very handy for portraits."—Hon. J. G. P. VEREKER.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden, Holborn Viaduct, LONDON



"OPTIMUS" RAPID RECTILINEAR.

DOUBLE F/8. **Second only to the Euryscope for rapidity, therefore well suited for instantaneous effects, outdoor groups and views, as well as interiors. Copying and Enlarging are also within the capabilities of the lens; in fact, its work may be styled "UNIVERSAL."**

Mounted in Brass, with Waterhouse Diaphragms.

To cover Focus	5 × 4 5½	6 × 5 6¾	7 × 5 8¼	8 × 5 10	9 × 7 12	10 × 8 14	12 × 10 18	15 × 12 20	18 × 16 25in.
	36/-	50/-	56/-	70/-	80/-	105/-	120/-	145/-	185/-

Mounted in Brass, with Iris Diaphragms.

46/-	60/-	66/-	80/-	92/-	120/-	136/-	160/-	200/-

Mounted in Aluminium, with Iris Diaphragms.

56/-	70/-	78/-	95/-	110/-	140/-	156/-	186/-	220/-

"Dear Sirs,—The Convention Group, reproduced in a reduced size in the *British Journal of Photography*, was taken by me with an 'Optimus' Rapid Rectilinear Lens, 18 × 15 I enclose rough print, from which you will see how well the lens covers to the edge of the plate. Note, also, the grouping is flat, not semi-circular, as is usual when the lens is not reliable. The lens could not be a finer one. I shall be pleased to appoint you sole London Agents for the sale of the prints."—ALEXANDER AYTON, Jun.

". . . . We may call attention to the extensive optical and metal works that Perken, Son & Rayment have established in Hatton Garden. We were much interested in the glass-grinding departments—one for photographic lenses, another for spectacles; and we were surprised to find in London such extensive workshops for the metal parts of cameras and optical lanterns."—*Photographic News.*

"We are pleased to find upon trial that the lens ['Optimus' Rapid Rectilinear] sent for review is really an EXCELLENT instrument."—*Photographic News.*

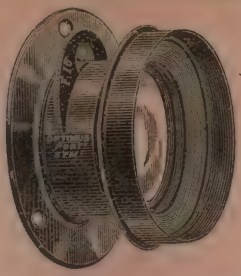
"Frith's series of 'Life in London Streets' were all taken with 12 × 10 *Portable* 'Optimus' lens on Cobb's plates. Had an 'Optimus' *Rapid* Symmetrical been used, the plates would have been over exposed with full aperture. G. LINDSAY JOHNSON, M.A., M.B., F.R.C.S., England."—*Amateur Photographer.*

"PORTRAIT LENS.—The 'Optimus' lenses are moderate in price, and yield most excellent results."—*Amateur Photographer.*

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99, Holborn Viaduct, Hatton Garden LONDON



"OPTIMUS" WIDE ANGLE SYMMETRICAL.

Portable Symmetrical (Double), F/16 with revolving diaphragms. Specially adapted for Architecture, being of short focus and wide angular aperture, can be used to advantage when very close to the subject. It is also useful for landscapes as well as copying. The smaller sizes give beautiful Lantern Slides, the definition being exceptionally crisp.

In Buass Mounts and Revolving Diaphragms.

To cover...	5×4	7×8	9×7	10×8	12×20	15×12	11×16 plates
	42/-	58/-	80/-	105/-	120/-	145/.	185/-

Mounted in Brass, with Iris Diaphragms.

	50/-	68/-	92/-	120/-	136/-	160/-	200/-

Mounted in Aluminium, with Iris Diaphrsmgs.

	60/-	78/-	110/-	140/-	159/-	186/-	220/-

We now turn to the 'Optimus' Rapid Euryscope, manufactured by the firm of Perken, Son & Rayment, Hatton Garden, an example of which is on a camera on our editorial table. With its full aperture of 1¼ in. (its equivalent focus being 11 in.) it defines with extreme brilliancy, and when used with a stop it easily covers a 10 × 8 plate to the corners, which is larger than that engraved on the mount as its possibility. Working as it does with such a large aperture (F/6 approx.) it serves as a portrait and group lens, as well as a landscape and copying objective. There is no doubt of its proving a most useful lens.—J. TRAILL TAYLOR."—*British Journal of Photography.*

"If E. G. E. wants the finest lens in the market he cannot do better than get the 'OPTIMUS.'—Professor DE FRERE."—*Amateur Photographer.*

"'OPTIMUS' EURYSCOPE.—I am much pleased with the 9 × 7 received last week. It covers 12 by 10 and gives splendid definition. For a good, useful, all-round lens I consider it perfect."—E. BRIGHTMAN, Hon. Sec., Bristol and West of England A.P.A.

"'OPTIMUS' EURYSCOPE.—This lens is of extra large diameter, the aperture being F/6, and while admitting of the most rapid exposures gives fine marginal definition. We have obtained with it most excellent portraits in an ordinary sitting-room. The lens is a most useful one all round.—T. C. HEPWORTH."—*The Camera.*

"As I have often said before, I consider these lenses unequalled.—E. J. WALL."—*Amateur Photographer.*

"I have tried the 7 × 5 'OPTIMUS' Euryscope. It is a very satisfactory lens, and covers the *whole plate* for interiors with F/16; being able to work at F/6 makes it very handy for portraits."—J. G. P. VERRKER.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

CINEMATOGRAPH LENSES,

As employed by some of the first Exhibitors of the day.

Brilliant Illumination—Crisp Definition.

SERIES OF 3 FOCI.

1⅛ inch Back Focus
2 " " "
3 " " "

EACH — **28s.**

STEREOSCOPIC LENSES,

SOLD IN PAIRS, ACCURATELY MATCHED,

AND

COVERING. 3½ x 3½ PERFECTLY,

Rapid Rectilinear, Aperture F.8 per pair, 80s.

Rapid Euryscope " F.6 " 120s.

In Aluminium Mounts, with Iris Diaphragms, extra " 15s.

GIVING BRILLIANT DEFINITION.

THE ABOVE ARE STRONGLY RECOMMENDED EITHER FOR

Stereoscopic Slides or Photographic Transparencies

FOR

MAGIC LANTERN PROJECTION.

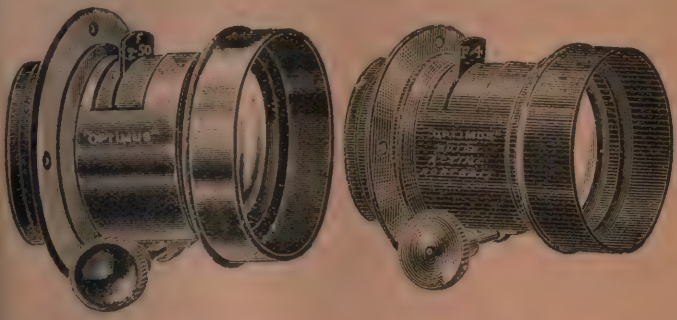
BRITISH JOURNAL OF PHOTOGRAPHY—

Being of short focus and fairly wide angle they include a very comprehensive amount of field; their optical perfection is such that the resulting pictures will bear almost unlimited enlargement.

CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



"OPTIMUS" QUICK-ACTING PORTRAIT LENS.

F.4 PORTRAIT LENS.—Specially constructed as quick-acting for short exposures in Portraiture. They are second to none, the definition being maintained by their perfect optical qualities.

Diam.	2 inches.	2½ inches.	3½ inches.	
Price	90/-	120/-	180/-	*Larger Sizes to Order.*
C. de V.	1B	Cabinets 2B	Grand Cabinets 3B	

"Dear Sirs,—Herewith your 7 × 5 'Optimus' Lens, which, as per your request, I have tried in the production of large heads. Along with it I send two negatives taken by it, the head in one of them measuring 2ins, that in the other being 3ins. In both the perspective seems right enough, there being no appearance of its being strained or violent.

"With us it was rather dark and rainy all day, and I took the negatives inside a room, without a diaphragm, exposure 7 secs. respectively. The SHARPNESS of all the planes of the head is good, as you will perceive. The distance of the sitter from the lens was 3ft. 6½in. for the larger head, and 4ft. 9in. for the smaller head.

Yours truly,
J. TRAILL TAYLOR."

"OPTIMUS" EXTRA QUICK-ACTING PORTRAIT LENS.

PORTRAIT LENS, F2. 50.—Very large aperture, therefore extra-quick acting; suited for taking portraits of young children, for which purpose it will be found eminently satisfactory.

	Focus.	Diameter.	Price.
2C ...	6½ inches ...	2½ inches ...	150/-
3C ...	8½ inches ...	3½ inches ...	220/.

CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

FITTING IRIS DIAPHRAGM

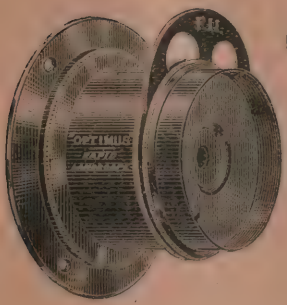
(Latest Improved Model)

TO YOUR OWN LENSES.

Size up to ...	5 × 4	7 × 5	9 × 7	10 × 8	15 × 12	18 × 16
	10/-	11/-	12/6	14/-	18/-	20/-

This includes calculating the Apertures required, engraving the Scale upon, and re-lacquering the tube.

"OPTIMUS" RAPID LANDSCAPE.



MOUNTED IN BRASS WITH REVOLVING DIAPHRAGMS.

RAPID LANDSCAPE.—Works F/11, and gives brilliant negatives. Particularly suited for landscapes, also capable of being worked as a Portrait Lens.

To cover ...	5 × 4	7 × 5	9 × 7	10 × 8	12 × 10 plates
Focus	5½	9	12	14	18 inches
	25/-	30/-	36/-	56/-	80/-

THORNTON-PICKARD AND ALL OTHER MAKERS' SHUTTERS

At Lowest Market Prices.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

"OPTIMUS" HAND CAMERA OR DETECTIVE LENS.

F/6 COVERING 5 × 4 PLATE.

IRIS DIAPHRAGM, ALUMINIUM MOUNT.

of the QUICK ACTING Euryscope Type.

Price 56/-

J. TRAILL TAYLOR stated in *British Journal of Photography*:

MESSRS. PERKEN, SON & RAYMENT have also submitted for examination a rapid doublet lens of their manufacture, suited for quarter-plate work, and particularly designed for hand or detective cameras.

The mount is of aluminium, with an Iris diaphragm, and is reduced to a minimum both as regards weight and bulk.

The lenticular components are constructed so as to give a wide visual angle, combined with great rapidity (F/6) and sharp defining power.

On the mount $4\frac{1}{4} \times 3\frac{1}{4}$ inches is engraved as the area the lens covers. We, however, find the circle of light it projects is equal to fully $6\frac{3}{4}$ inches diameter. This is a highly elegant optical production.

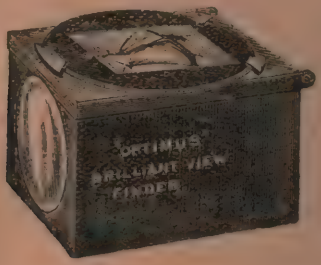
E. J. WALL stated in *Amateur Photographer:*

THE "OPTIMUS" DETECTIVE LENS.—This is a new aluminium mounted rectilinear lens with Iris diaphragms, especially arranged to suit hand camera or detective work. The components are placed close together and give wide visual angle, but not so close as to sacrifice marginal definition when working with large aperture, for the extremes of diagonal of $4\frac{1}{2} \times 3\frac{1}{4}$ plate are covered with good definition with opern aperture, F/6, and the circle of light is equal to the diagonal of a $6\frac{1}{2} \times 4\frac{3}{4}$ plate.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON



"OPTIMUS" BRILLIANT VIEW FINDER.

Perfectly Distinct in Sunshine.

This little instrument has NO ground glass, but gives a Perfect image, most intensely brilliant and absolutely distinct.

The visual angle accords with our own and other popular makes of Lenses.

Supplied in Two Sizes.

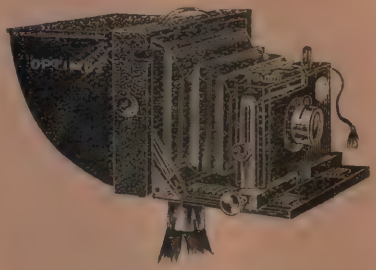
Small	**7/6**
Large	**10/-**

T. C. HEPWORTH says in *Photographic News*—"MESSRS. PERKEN, SON & RAYMENT are now fitting to hand cameras an improved finder, which they call "The Brilliant," and its name is well chosen. It consists of a particular arrangement of lenses and a mirror which dispenses altogether with the use of a ground glass screen. The image is most brilliant, and can be seen without any shade in bright daylight."

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON





"OPTIMUS" KOPIT HAND CAMERA.

£5. 5. 0 COMPLETE.

This Camera is of such small size that it may be readily carried in the pocket. When in use it can be held in the hand, or it can be attached with screw to Tripod for either horizontal or vertical pictures. Among the many advantages it possesses are the following:

* Rack and Pinion focussing adjustment.
* Rising and falling front.
* Thornton Pickard Roller Blind Shutter.
* Automatic Hood attached to Ground Glass, rendering focus cloth unnecessary.
* Three double dark Slides.
* Best workmanship throughout.
* Well seasoned, highly-polished Mahogany, or
* Mahogany, covered with black leather of durable quality.
* "OPTIMUS" Extra Rapid Euryscope, F.6., in aluminium mount, fitted with Iris Diaphragm.

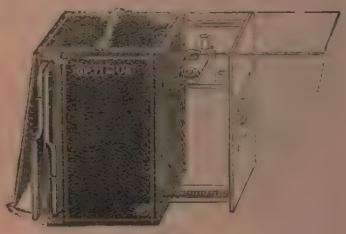
CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden, Holborn Viaduct, LONDON



CLOSED.



OPEN.

"OPTIMUS" CAMERA DE POCHE.

Pictures $4\frac{1}{4}$ x $3\frac{1}{4}$ inches (Quarter-plate).

Covered with Durable Hard Grained Leather.
Outside Dimensions $3\frac{3}{4} \times 4\frac{1}{2} \times 5$ inches.

PRICE, Complete with Three Double Dark Slides and 'Optimus' Rapid Euryscope Lense, £6 6s.

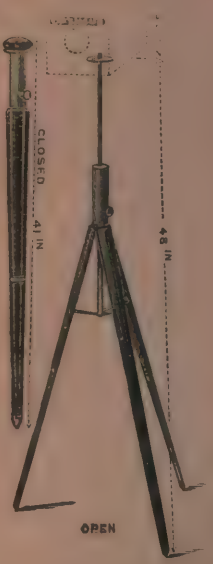
WALKING STICK TRIPOD STANDS

SPECIALLY ADAPTED FOR

HAND CAMERAS.

This is a compact Stand and occupies but little space. It is of Black Wood with Nickelled Metal Ferrule, etc., altogether a very genteel and handy adjunct for Hand Camera Workers.

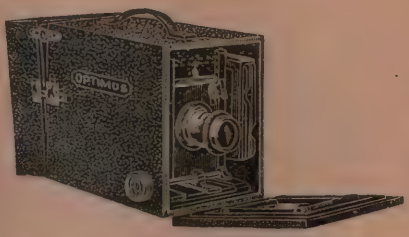
PRICE, 10/-



'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

FOR USE IN THE HAND



OR ON TRIPOD STAND.

"OPTIMUS" UBIQUE IMPROVED HAND CAMERA.

SUITABLE FOR

SNAP SHOTS, LANDSCAPES and PORTRAITS.

The instrument sold under this name by us during the last three seasons has met with very decided success. We have, therefore, to further encourage its sale, greatly improved the model: firstly, by fitting a rack and pinion adjustment for focussing, actuated from the outside of the instrument; secondly, by supplying a Roller Blind Shutter with it. The three double dark slides and focussing screen are enclosed within the instrument, so that it is self-contained. It has the necessary screw for attachment to a tripod top, or it may be used in the hand for instantaneous snap-shots.

The EXTERNAL DIMENSIONS are $8\frac{3}{8} \times 4\frac{3}{8} \times 5\frac{3}{8}$ inches, and the black outside leather with which it is covered is really of good quality.

With "OPTIMUS" Rapid View LENS ...	...	...	55/-
" " " Rectilinear	...	...	80/-
" " Extra " Euryscope	...	...	100/-

The above Camera fitted with RISING FRONT, Also with Horizontal and Vertical SWING BACK. 15s. Extra.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden, Holborn Viaduct, LONDON



"OPTIMUS" HAND MAGAZINE TWIN-LENS CAMERA

24 FILMS ON CELLULOID. NO DARK SLIDES

Full Size facsimile View during Exposure

Films changed by turning a button.

FILMS DO NOT REQUIRE NOTCHING OR CUTTING.

Rack and Pinion for exact adjustment of focus, so ensuring sharply defined pictures.

Price, with Pair of Rapid Rectilinear Lenses, and Roller Blind Shutter **£15 15 0**

The Lenses may be used for Stereoscopic Work.

Extract from AMATEUR PHOTOGRAPHER:—

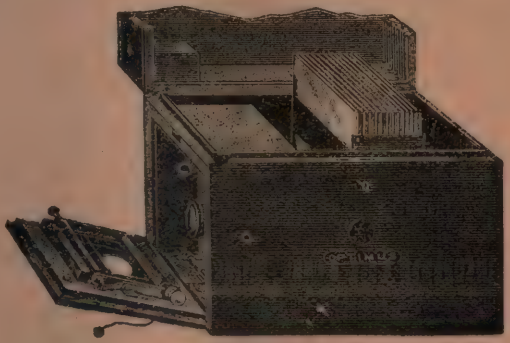
THE MAGAZINE TWIN-LENS CAMERA.

This is a twin-lens Camera with rack and pinion focussing adjustment, and carries twenty-four celluloid films of any make in sheaths, which drop down from the upper storage chamber into the lower for exposure. The front shield fills up and forms an efficient sky shade. It it extremely light, and possessing as it does the great advantage of a full-sized finder with a roller-blind shutter, it is capable of tackling every kind of work, both stand and hand. Price, fitted with two rectilinear lenses, which can be used for stereoscopic work 15 guineas.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



"OPTIMUS" IMPROVED MAGAZINE HAND CAMERA.

For either Twenty-four Films on Celluloid or Twelve Films on Glass.

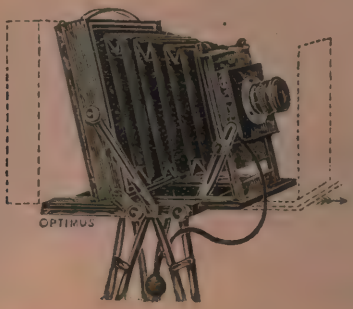
Price, with "Optimus" Extra Rapid Euryscope Lens, mounted in Aluminium, fitted with Iris Diaphragms, **£10 10 0.**

The Original Optimus" Magazine Camera was highly extolled on all sides as the least complicated of Reservoir Cameras; but the present Model is superlatively perfect in the simplicity of its parts, and absence of unnecessarily intricate mechanism. The grooves in which the Films or Plates are placed are continuous from the upper, or Reserve Chamber to the lower, or Exposure Chamber. The Plates simply slide by their own weight from the upper to the lower chamber, without passing from box to box through a slot or performing any acrobatic feats. The Rapid Euryscope Lens can be accurately focussed from outside the box by Rack and Pinion. The Finders give proportionate images. A well-finished Roller Blind Shutter is fitted. This instrument will be appreciated by those who desire Simplicity and Efficiency.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden, Holborn Viaduct, LONDON



"OPTIMUS" UNIVERSAL PHOTO OUTFIT.

This Camera is very LIGHT indeed but, being thoroughly well made, is very RIGID. It possesses leather bellows, and, as the diagram shows, a front and back swing, rising and falling front, mechanism for advancing the focussing screen quite near to the front when a short-focus lens is in use, square reversing frame, in fact all necessary movements. The Lens is a Rapid Rectilinear, with Roller Blind Shutter fitted. The Tripod is very compact, strong, and rigid

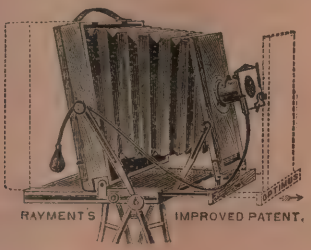
HALF-PLATE SIZE.

With French Rapid Rectilinear	...	...	£4 0 0
,, Optimus Rapid Rectilinear	...	...	£5 15 0
,, Optimus Extra Rapid Euryscope	...		£7 7 0

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON



RAYMENT'S WIDE ANGLE. CAMERA.

EXTRA LONG FOCUS.

Extract from the *British Journal of Photography*.

"The present Model Rayment Camera is among the VERY LIGHTEST of actually RIGID Cameras offered to the Public.

"The RAPIDITY of OPENING and CLOSING is greatly facilitated by the additional arrangement for throwing the pinion out of gear from the rack.

"There is NO CURTAILMENT OF VIEW when lenses of short focus and wide angular aperture are in use.

"ALL MOVEMENTS NECESSARY to the modern scientific photographer are included in this COMPACT instrument."

T. C. HEPWORTH, F.C.S., says: "The Rayment Camera in particular claims attention, both for its BEAUTY OF WORKMANSHIP, and for the EASE and READINESS with which it can be put into action."

Price, including 3 Double Dark Slides—

4¼ × 3¼	5 × 4	6½ × 4¾	8½ × 6½	10 × 8	12 × 10	15 × 12
120/-	126/-	145/-	168/-	230/-	278/-	334/-

PHOTOGRAPHIC OUTFIT.

Including RAYMENT'S CAMERA and Three Double Dark Slides, "Optimus' Rapid Rectilinear Lens, Instantaneous Shutter, Tripod, Waterproof Case, complete—

4¼ × 3¼	5 × 4	6½ × 4¾	8½ × 6½	10 × 8	12 × 10	15 × 12
£10	£11	£12	£15	£20	£25	£31

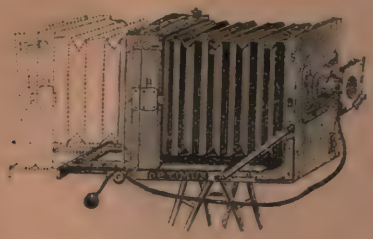
This Outfit with Extra Rapid Euryscope Lens, instead of Rapid Rectilinear, extra—

27/-	27/-	37/-	36/-	78/-	200/-

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



"OPTIMUS" LONG FOCUS CAMERA.

The Instrument can be set up almost instantaneously, has no loose parts, and includes all motions, having hinged focussing screen (adjusted by rack and pinion action), double swing back, cross fronts, reversing back arrangement so that oblong dark slides give either horizontal or vertical pictures without unscrewing the Camera from the Tripod.

Price of Camera, including 3 double dark slides—

4¼ × 3¼	5 × 4	6½ × 4¾	8½ × 6½	10 × 8	12 × 10	15 × 12
130/-	133/-	137/-	175/-	237/-	290/-	335/-

"OPTIMUS" PHOTOGRAPHIC OUTFIT.

Comprising Camera as above, 3 Dark Slides, "Optimus" Rapid Rectilinear Lens, Instantaneous Shutter, Tripod Stand, and Waterproof Case, complete—

4¼ × 3¼	6½ × 4¾	8½ × 6½	10 × 8	12 × 10	15 × 12
£10	£12	£15	£20	£25	£31

This Outfit, with Extra Rapid Euryscope Lens, instead of Rapid Rectilinear, extra—

4¼ × 3¼	6½ × 4¾	8½ × 6½	10 × 8	12 × 10
27/-	37/-	36/-	78/-	200/-

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT 99 Hatton Garden Holborn Viaduct, LONDON

FOCUSSING GLASSES.



Plain Cylinder, 8d.
Sliding „ 1/-



Screw Adjustment, 1/3-



Superior Sliding Adjustment. 2/-



Archimedean Screw Adjustment. 4/6 each.

COMBINED FOCUSSING GLASS AND FINDER



Bell Shape, 2 - each.



Screw Adjustment, 2/6 each



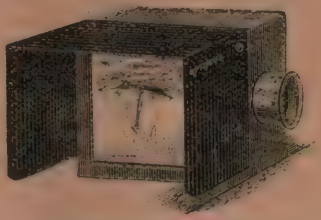
Sliding Adiustment 3/ - each.

"OPTIMUS" VIEW FINDERS.



MAGNIFYING FINDER

1½in. bi-concave each 2/6
2½ „ „ „ 2/9
3½ „ „ „ 3/-



CAMERA OBSCURA MODEL.

Small ... ... 4/- each
Large ... ... 5/- „

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Gardeu, Holborn Viaduct, LONDON





THREEFOLD TRIPOD STAND.

Rule Joint, Sliding Legs so as to suit uneven ground. Very compact, strong and rigid.

Without Top (for Cameras with Turntables)... **16/6**

With Tops **18/6**

FOURFOLD TRIPOD STAND.

Very Portable.
16½ inches when closed.
52 inches high when set up
Top leather covered ... **15/-**

Choice Wood. Perfect Workmanship. Excellent Finish.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden, Holborn Viaduct, LONDON

erfect Workmanship and Finish.
Choice Wood.





TWO-FOLD OR E.P. STAND.

Strong and Rigid.

$6\frac{1}{2}\times4\frac{1}{4}$	$8\frac{1}{2}\times6\frac{1}{2}$	10×8
8/-		12/6

Three-fold. Sliding Leg.

Very Rigid.

Half-plate	... ...	11/-
Whole ,,	... ...	16/-

HREEFOLD TRIPOD STAND

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

LINED WITH  GREEN CLOTH

SUPERIOR CAMERA CASES.

MADE OF STRONG WATERPROOF CANVAS.

Lined with Dark Green Cloth.

SQUARE OR ALMOST SO—

Leather Handle, Leather Straps, and Spring Lock and Key.

for Half-Plate Camera and 3 Dark Slides	15/9
Ditto Whole-Plate Camera and 3 Dark Slides	20/-
,, 10 × 8 ,, ,, ...	21/6
,, 12 × 10 ,, ,, ...	28/-

OBLONG—

Made of same Material as above.

For Quarter-Plate Camera and 3 Dark Slides	10/6
,, Half ,, ,, ,, ...	15/-
,, Whole ,, ,, ,, ...	20/-

LEATHER thoroughly durable and strong, made **SQUARE OR NEARLY SO—**

For Half-Plate Camera and 3 Slides, with Lock and Key	20/-
,, Whole ,, ,, ,, ,, ...	29/-
,, 10 X 8 ,, ,, ,, ...	35/-
,, 12 X 10 ,, ,, ,, ...	46/-

Any size made to order on receipt of dimensions.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON



"OPTIMUS" TELESCOPIC TRIPOD FOR CAMERAS.

Price 28/-



Section showing the form of Tube, the three legs being close together.

Being made of Aluminum, this Camera Stand is admirably adapted for Cyclists, Tourists, and others who desire a light rigid Tripod. Though occupoing exceedingly little space when closed it extends to a full practical height when opened for use.

TELESCOPIC TRIPOD.

CIRCULAR TUBE.



Section shows the three circular Tubes when closed together.



Brass throughout, highly polished and lacquered **12/6**

Aluminimum throughout, highly polished and lacquered **20/-**

Aluminium throughout, japanned black **21/-**

Brass outside tube, all inner tubes Aluminium **20/-**

CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON

"OPTIUMS" INFALLIBLE DEVELOPER.

The Components of this Developer are perfectly pure, and the exact quantities necessary are employed, so ensuring the best possible negatives, whether Landscapes or Portraits, be the Exposures Instantaneous or Prolonged.

TO PREPARE THE DEVELOPER.

Place the contents of one packet of each coloured paper (Gold, Silver and Blue) into a vessel and pour upon it 9 ozs. of pure water, preferably distilled, that is, one-tenth less than half a pint. Should it be desirable to mix the whole quantity at one time add 36 ozs. of water to the 12 packets. When completely dissolved it is ready for use.

TO ECONOMISE THE DEVELOPER.

After developing, pour the used Developer into a second bottle for it can be advantageously employed in developing other plates.

To obtain the best possible results we commend the following instructions to the CAREFUL attention of the operator:

For Plates

Over Exposed	**use Old Developer only.**
Instantaneously Exposed	**,, New Developer ,,**
Under Exposed	**,, Half Old & Half New.**

Place the plate in the developing dish or tray, and pour over it sufficient Developer to cover the upper surface thoroughly.

When the detail does not appear as quickly as expected, add new developer, or use new only, as may be found necessary.

IN PACKETS SUFFICIENT FOR 100 ¼-PLATES.

PRICE 1s. 6D.

*** The temperature should not be much below or above 60° Fahrenheit, or the action of the developer will become retarded.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

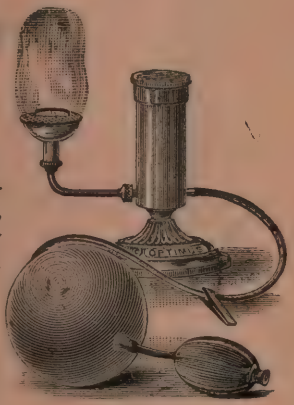
PERKEN, SON & RAYMENT, 99, Hatton Garden Holborn Viaduct, LONDON

"OPTIMUS"

1.000 CANDLE-POWER

(PHOTO EXPOSURE)

ILLUMINATOR.



Magnesium powder is uninterruptedly blown through a spirit flame, causing not flashes—but a continuity of light more perfectly actinic than any other known.

Complete with double inflation blower,

15s.

"OPTIMUS"

HOROLOGICAL MAGNESIUM RIBBON LAMP.



The Clock Movement is of superior finish. It feeds out the Ribbon at the necessary speed.

20/-.

Extra Coils of Ribbon, each 1/-.

CATALOGUE POST FREE DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



NON-ACTINIC LAMP FOR THE DARK ROOM.

With Brass Oil Reservoir.

Strong, and of Superior Finish. Complete, 4-

ARGAND BURNER.

Recommended with Confidence for Safety, Cleanliness, and Economy.

NON-ACTINIC LAMP FOR THE DARK ROOM.

With Brass Oil Reservoir, &c. and Bracket of Brass

7/6



CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



"OPTIMUS" SQUARE FOLDING LAMP.

FOR TRAVELLING.

Non-actinic fabric, non-breakable.

This lamp folds into very small space, suitable for carrying in the pocket, when travelling. The sides are not glass, but a ruby fabric. (Unbreakable) each 1/6



"OPTIMUS" DWARF DARK ROOM LAMP.

To burn night lights supplied in glass vessel. Has a non-actinic ruby glass.
Superior London made ... each 1/-



"OPTIMUS" TRIANGULAR DARK ROOM LAMP

Made in two sizes.

Body 8in. high, exclusive of chimney 7/4
Body 12in. high, argand burner ... 10/-

The back or third side is a ventilating door, through which the wick regulator passes, allowing the wick to be adjusted from the outside when the door is closed. The two front sides are of ruby glass.
The large size is suited for studio use.

CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON





"OPTIMUS" LAMPS FOR THE DARK ROOM.

The form of Lantern shown in the accompanying diagram presents a great many advantages. It possesses a powerful Lamp, so arranged that the oil receptacle is isolated from the flame and cannot get heated. Plenty of air circulates. In front is a sheet of ruby glass (removable), behind which is a sheet of deep orange; it is, therefore, safe when developing the most sensitive of Plates. As the development progresses, the ruby glass can be raised, and the Negative examined by the orange glass only, enabling the amount of detail to be readily judged ... ... each 7/4

FOLDING LAMP.—An inexpensive form of Lamp, having two sides of metal, and the third of red glass. The metal sides are hinged together, so that they fold up for travelling, with the ruby glass protected from fracture by lying between them. Top and bottom triangular pieces—one holding a candle-holder and the other a chimney—complete this clever little arrangement ... each 2/-

REDDINGS' PATTERN PORTABLE LAMP—

Small, 1/6; and Large, 2/6 each.

CANDLES for above, Small, 1/6; Large ditto, 2/- per doz.

CATALOGUE POST FREE. . DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99, Hatton Garden Holborn Viaduct, LONDON



15/- Each.

SPECIALLY DESIGNED FOR PROFESSIONAL PHOTOGRAPHERS.

"OPTIMUS" UNIVERSAL DARK ROOM LAMP.

From the British Journal of Photography.

"The principles upon which this lamp are constructed are such as to render it of great practical service for dark room work, and having had it in practical use, we can testify to its utility. It is made for gas, and has a ventilating shaft not shown in the cut. It will be observed that movable windows of ground, ruby, and orange glass are fitted to the lamp, an arrangement that allows the colour of light being varied at will—a great convenience to those whose photographic operations include the manipulation of bromide paper, orthochromatic, and very sensitive plates, &c. We can strongly recommend the lamps."

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON



"OPTIMUS" PROJECTION CAMERA

TRIPLE QUICK ACTING RACK AND PINION ADJUSTMENT

FOR PHOTOGRAPHIC ENLARGING AND REDUCING.

In constructing this instrument special care has been taken to mainatin the minimum of bulk, and the maximum of focal adjustment. When fully extended it is three times as long as when closed. A Compound Condenser is included, and fixed into an adapter very easily withdrawn, so that another of different size may be readily substituted. This changing of Condensers enables the operator to obtain the best possible illumination whatever may be the size of his negative and to avoid the loss which must occur when the diameter of the Condenser greatly exceeds the diagonal of the plate to be copied. Three milled heads will be found near the baseboard attached to pinions and racks of the "Optimus" Patent Quick-acting Arrangement. One actuates the front chamber which carries the lens, another the rear chamber which carries the illuminant, and the third the condenser and negative, allowing of a final exact adjustment immediately before exposure, when it may be required. The Body is of Superior Mahogany, ornamentally moulded and panelled. Altogether a very elaborate and complete instrument, warranted to facilitate the production of perfect results.

Complete with—

5in.	Compound	Condenser,	130/-	with	Projecting	Objective,	37/-
6	"	"	160/-	"	"	"	37/-
7	"	"	180/-	"	"	"	37/-
8	"	"	260/-	"	"	"	63/-
9	"	"	300/-	"	"	"	63/-
10	"	"	370/-	"	"	"	63/-
12	"	"	500/-	"	"	"	105/-
14	"	"	600/-	"	"	"	120/-

Either 4-wick Oil Lamp, Safety Oxy-hydrogen Gas Jet or Argand Gas Burner supplied with the Instrument.

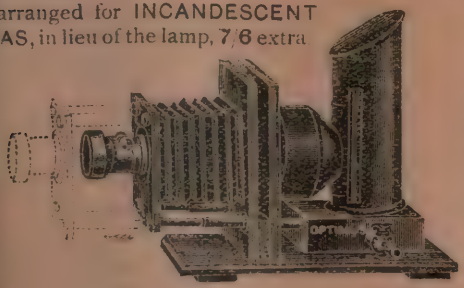
CATALOGUES POST FREE. DISCOUNT TO THE TRADE

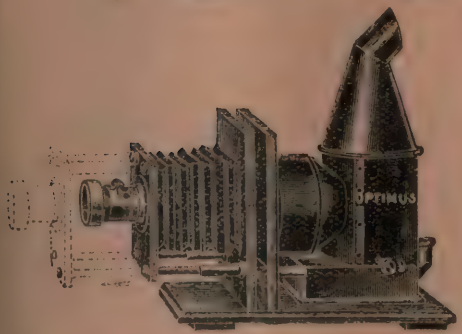
'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON

"OPTIMUS" CANTILEVER ENLARGING APPARATUS.

If arranged for INCANDESCENT GAS, in lieu of the lamp, 7/6 extra





We are now offering a series of instruments of this already popular model, finished in the best and most practical style. The mahogany is well-seasoned, the brasswork beautifully polished, the bellows of durable leather, the oil lamp gives a brilliant light, and the optical system is of the best.

The Lenses will be found to give a very flat field and good marginal definition.

THE 4-INCH IS SPECIALLY SUITED FOR POCKET KODAK AND BULLS-EYE NEGATIVES.

Diameter of COMPOUND CONDENSER	4in.	5in.	6in.	8in.	9in.	10in.
Price, without front lens	62/-	70/-	80/-	110/-	150/-	200/-
Extra for front lens	27/-	27/-	37/-	63/-	63/-	105/-
Covering Plates	3¼ by 3¼ in.	4¼ by 3¼ in.	5 by 12 c/m	6½ by 4¾ in.	7⅞ by 5 in.	8½ by 5½ in.

CARRIAGE PAID FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON



PORTABLE GENERATOR

FOR PRODUCING

ACETYLENE GAS

For Magic Lantern Illumination,

25s.

SUITABLE BURNER with ARM and REFLECTOR, 300 Candle Power,

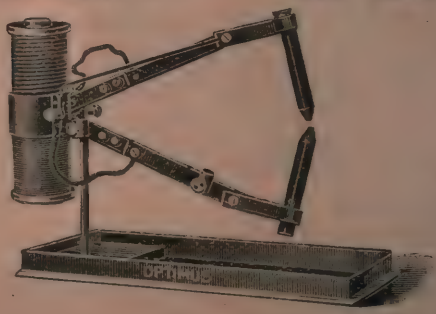
12/6.

See *British Journal of Photography*, October 29th, 1897, for effect of Acetylene on Insurance Policies

The Gas is generated in a suitable miniature gasometer—24 × 8 inches. The quantity generated is only equal to the quantity consumed. The system combines simplicity and safety, with that all important consideration, ECONOMY.

AUTOMATIC ELECTRIC ARC LAMP.

Packs in 9½ by 6 by 3½ inches.



Weight under 3lbs.

Carbons lasting 4 hours

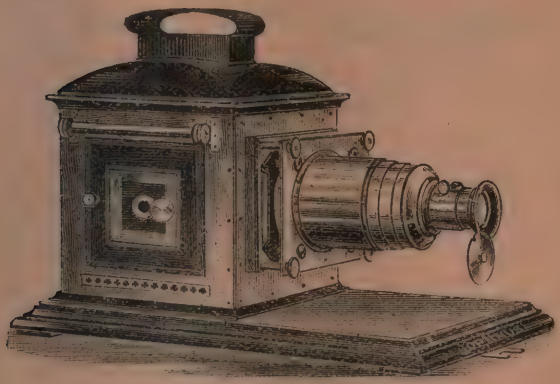
PRICE ... ... **£4.**

This Arc Lamp is suited for all optical Lanterns. It works o Direct and Alternating Currents. It fits on the ordinary lime-light tr without alteration, the light being centred in the same way as ordinary lime-light jet.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



SUPERIOR OPTICAL LANTERN.

For Drawing-room or Lecture Hall.

EVERY PART OF THIS LANTERN IS OF FIRST SELECTION.

This form of Instrument is specially suited for exhibitions. Each Lantern is fitted with Safety Blow-through Jet for Oxy Hydrogen Light or with 4-wick refulgent Lamp as may be preferred. The 4 in. Compound Condenser is of very superior quality, free from flaws. as is also the front lens, and the resulting image on the screen will amply satisfy the most critical.

The projection lens is picked from a number and guaranteed to give specially sharp definition, being a high-class instrument of the Petzval form (achromatic).

With Single Telescopic Draw Tube	...	£6 6s.
With Triple Telescopic Draw Tube	...	£7 7s.

CATALOGUE POST FREE DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden, Holborn Viaduct, LONDON

SLIDE OUTFIT FOR "OPTIMUS" MAGIC LANTERN

Reference Letter **H.**

PRICE . . . **84/-**

COMPRISING—

24 Best Photographic Transparencies, 1/- each.

48 Transparencies, Printed in Colours.

1 each Motto Slide, Coloured—"Welcome," "Good Night," "Adieu," "Silence," "Happy Returns of the Day," "Happy Christmas."

Sliding Carrier Frame to show the above in Lantern.

24 Best Comic Slipping Slides, Painted in Colours.

1 Rack Work Slide, "Bee Hive and Flying Bees."

1 " " " "Windmill Working."

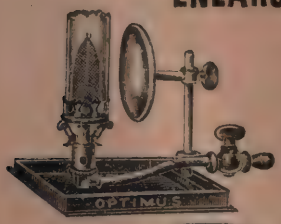
Packed in separate Wood Cabinet, or in a specially made Box to carry Slide Outfit and any one of our series of Magic Lanterns.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

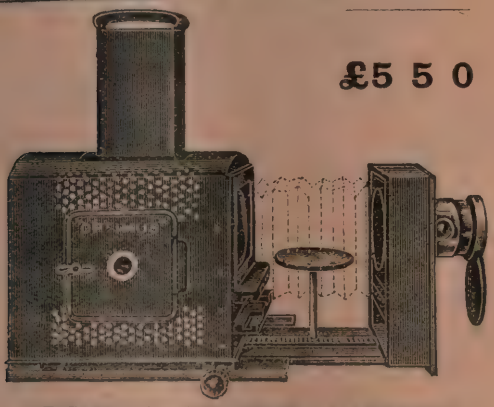
PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON

ARM FOR ADAPTING INCANDESCENT GAS TO ENLARGING OR MAGIC LANTERN.



Price of Arm only	4/-
,, Arm and Tray	5/-
,, Arm, Tray, and Burner	12/6
Mantles ... ... each	1/3
If with Reflector, extra	3/6

£5 5 0



OPTIMUS SCIENCE LANTERN.

Price. £5 5s., with 3-wick Lamp.
,, £5 12s., with Blow-through Jet.

The body has two walls of Russian iron, an outer (perforated) and an inner, which are separated by an air space, so that the outer surface does not become overheated. The bellows can be instantaneously liberated and pushed into the front, so that DEMONSTRATIONS may be conveniently and uninterruptedly conducted.

Accommodation for Troughs and Glass Tanks.

The adjustment allows lenses of varying foci (from 4 to 12 inches) to be used.

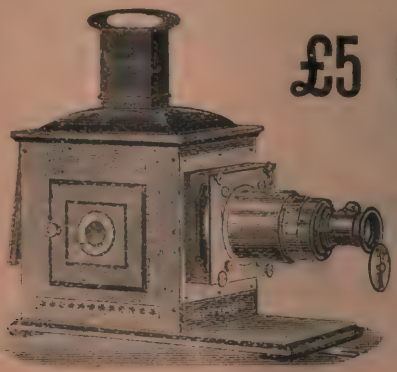
The instrument may also be used for enlarging small negatives.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON

OXY-HYDROGEN FITTED AT AN EXTRA COST, OF 16S. . . OR IN LIEU OF LAMP, 7S. 6D.



£5 5s.

"OPTIMUS" (SUPERIOR MAHOGANY) MAGIC LANTERN.

FULL LENGTH SOLID BASEBOARD, BRASS STAGE and 3-Draw TELESCOPIC DRAW TUBES.

The outside body is of superior and well-seasoned mahogany, having a panelled door on either side into which sight holes are recessed. The interior lining is of strong metal. Between it and the mahogany body is a space for air to circulate freely and so keep the outside cool and convenient to the touch. The stage plate and three-draw telescopic tubes are of highly finished brass, as is also the O.G. flange for connecting a specially selected Petzval Portrait combination Front lens (achromatic), which gives brilliant and crisp definition. It has rack and pinion focussing adjustment. The condenser, which is a picked one and free from flaws, is composed of two plano-convex lenses of 4 inches diameter

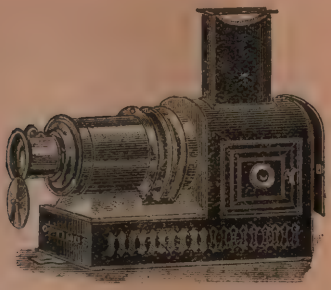
The THREE WICK REFULGENT LAMP.—Best London make bearing our own name and trade mark, is specially selected from a number. Wicks are 2 inches wide and burn paraffin oil. Chimney is of Russian iron, securely jointed without solder.

Complete in outside box, which is arranged to be used as a support for the lantern during an exhibition or lecture.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



63/-

"OPTIMUS" EDUCATIONAL OPTICAL LANTERN.

	£	s.	d.
The Body is made of substantial Russian Iron, therefore very durable and unlikely to rust. It is of small size and light weight, therefore very portable. The Stage Plates and Sliding Tube are of well-finished brass. The Lens is a first class Petzval Portrait Combination, giving really excellent definition. The Lamp is a Three Wick Refulgent, or a Four Wick if preferred. Complete in Outside Box for carrying	3	3	0
It fitted with Superior Blow-Through Jet for Oxy-hydrogen Lime Light	3	10	6

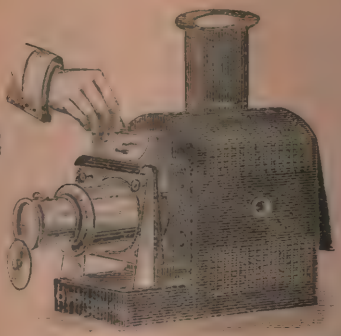
STRONGLY RECOMMENDED.

CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

OXY-HYDROGEN GAS CAN BE FITTED AT AN EXTRA COST OF 16/- OR IN LIEU OF LAMP 7/6.



60/-

STUDENT'S RUSSIAN IRON BODY LANTERN.

Perforated Body ... 60/- Body not Perforated ... 55/-

To Accommodate Glass Tank and Display Living Objects upon the Screen.

SUITED FOR LECTURE-HAL or DRAWING-ROOM.

The Body is of Stout Russian Iron; the Stage and Telescopic Draw Tube is of Finished Brass; the Lens is a selected one of the Petzval Portrait Combination (Achromatic), adjustable by Rack and Pinion; Compound Condenser of 4-inchs Diameter (Two Plano-Convex Lenses); THREE WICK REFULGENT LAMP of the best LONDON MAKE, Wicks 2 inches wide, burning Paraffin Oil: Chimney of Russian Iron securely jointed without Solder, Complete in Box, which is arranged for use as a support when displaying the Lantern,

SLIDE OUTFIT FOR ABOVE.

Reference Letter **G**

Comprising:—
20 Best Photographic Transparencies.
16 Transparencies Painted in Colours.
1 Motto Slide, "Welcome."
1 " "Good Night."
Sliding Carrier Block to display above in the Lantern.
19 Coloured Comic Slipping Slides.
1 Chromatrope (Coloured).
Animalcular Tank.

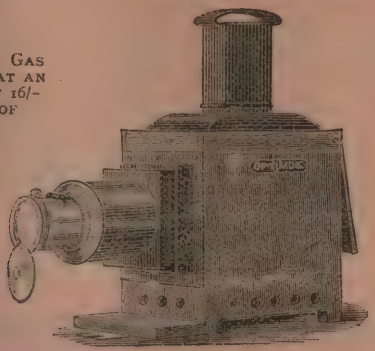
60/-

CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Gordon, Holborn Viaduct, LONDON

OXY-HYDROGEN GAS CAN BE FITTED AT AN EXTRA COST OF 16/- OR IN LIEU OF LAMP 7/6



52/-

"OPTIMUS" MAHOGANY MAGIC LANTERN.

Mahogany outside Body, Japanned Metal Stages and Sliding Tubes.

The exterior body if made of well-seasoned mahogany, lined with stout metal. Between these two bodies is a space, so that air can circulate freely, and keep the outer body cool for handling.

A Draw Tube is fitted to the Stage, and Brass Nozzle is provided to attach the Front Lens, which is a Petzval Portrait Combination (Achromatic) adjustable for Focussing by Rack and Pinion; the Condenser is a compound of two four-inch Plano-Convex Lenses; THREE WICK REFULGENT LAMP of the best LONDON MAKE—bearing our Name and Trade Mark; the wicks of which are two inches wide, and burn paraffin oil; Chimney of Russian Iron, securely jointed without solder; Complete in Box, which is arranged for use as a support when displaying the Lantern.

SLIDE OUTFIT FOR THE ABOVE.

Reference Letter **F.**

PRICE . . **52/-**

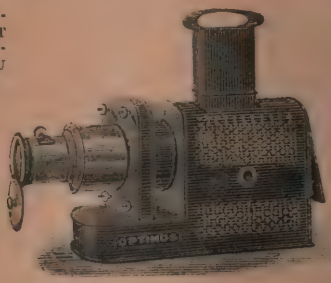
20 Best Photographic Transparencies.
16 Transparencies, Painted in Colours.
1 Transparent Motto Slide, "Welcome."
1 " " " "Good Night."
1 " " " "Merry Xmas."
Sliding Carrier Block to display above in the Lantern.
20 Comic Sliuping Slides, Coloured.
Packed in Box with the above or with any other of our series of Lanterns.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON

OXY-HYDROGEN - CAN BE FITTED AT AN EXTRA COST - OF 16s., OR IN LIEU OF LAMP, 7s. 6d.



50/-

"OPTIMUS" MAGIC LANTERNS.

Perforated Russian Iron Body, Brass Sliding Tubes and Stage Plate,

For Dissolving, 2 Lanterns are necessary.

SUITED FOR DRAWING-ROOM AND LECTURE-HALL.

The Body of the Instrument is two thicknesses of stout Russian Iron, the outer one perforated so as to allow air to pass and keep it cool; the Stage Plate and Telescopic Draw Tube are of finished Brass; the Lens is a selected one of the Petzval Portrait Combination (Achromatic); Rack and Pinion Adjustment for Focussing; the Condenser is formed of two Plano-Convex Lenses of four inches diameter; THREE WICK REFULGENT LAMP of the BEST LONDON MAKE; wicks two inches wide, burning paraffin oil; the Chimney is of Russian Iron, securely jointed without solder. Complete in Box, which is arranged for use as a support when displaying the Lantern.

SLIDE OUTFIT FOR ABOVE.

Reference Letter **E.**

PRICE - - - 50/-

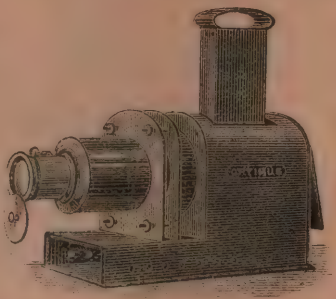
12 Best Photographic Transparencies.
36 Transparencies, Painted in Colours.
1 " Motto, "Welcome."
" " "Good Night."
1 " "Silence."
Sliding Carrier Block to display above in the Lantern.
18 Comic Slipping Slides, Coloured.
Packed in Box with above Lantern.

CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

OXY-HYDROGEN GAS CAN BE FITTED AT AN EXTRA COST OF 16s, OR IN LIEU OF LAMP, 7s. 6d.



45/-

RUSSIAN IRON MAGIC LANTERN.

Finished Brass Sliding Tubes and Stage Plate.

For Dissolving, 2 Lanterns are necessary.

SUITED FOR DRAWING-ROOM AND LECTURE-HALL.

The body of the instrument is of stout Russian iron. The stage plate and draw-tube are of finished brass. The Petzval Portrait Combination Lens (achromatic) is selected, and has rack and pinion focussing adjustment. The Condenser is 4 ins. in diameter, formed by two plano-convex lenses.

A THREE-WICK REFULGENT LAMP of the best LONDON MAKE, bearing our name and trade mark. Wicks 2 inches wide, burning paraffin oil, Russian iron chimney, securely jointed without solder.

Complete in Box which is arranged for use as a support when displaying the lantern.

SLIDE OUTFIT FOR ABOVE.

Reference Letter D. PRICE 45/-

Comprising :—

6 Best Photographic Transparencies	..	..	.. 1/:
36 Transparencies Printed in Colours	..	..	.. ..
1 ,, Motto ..	..	..	.. "Welcome."
1 ,, ,, ..	..	..	.. "Good Night."
1 ,, ,, ..	..	..	.. "Merry Christmas."
1 ,, ,, ..	..	..	.. "Silence."

Sliding Carrier Block to display above in Lantern.

30 Comic Slipping Slides, Coloured.

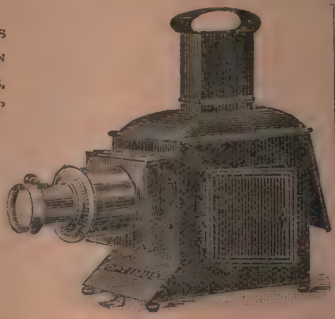
Packed with Lantern in its box or in separate box

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

OXY-HYDROGEN GAS CAN BE FITTED AT AN EXTRA COST OF 16s. OR IN LIEU OF LAMP 7s. 6d.



SECOND QUALITY LANTERN, 21/-

30/-

OUR OWN LONDON MAKE.

"OPTIMUS" MAGIC LANTERN.

Superior Japanned Metal Body. 30/-

For Dissolving, Two Lanterns are necessary.

SUITED FOR DRAWING-ROOM AND LECTURE-HALL.

Stout metal body, thoroughly well japanned, side and back doors, telescopic draw tube, with brass nozzle Petzval portrait combination front lens (achromatic), having rack and pinion for focal adjustment. Pivoted flashing shutter. Compound condensing lens, composed of two plano-convex lenses of 3 inches diameter.

THREE WICK REFULGENT LAMP (BEST LONDON MAKE), burning paraffin oil, wicks two inches wide. Chimney of Russian iron, securely joined without solder.

Complete in outside box, which is arranged for use as a support when displaying the Lantern.

SLIDE OUTFIT FOR THE ABOVE.

Reference Letter **B.**

PRICE - - - 30/-

Comprising:—
36 Coloured Transparencies. 12 Uncoloured Photographic Transparencies.
With Sliding Carrier to display them in the Lantern.
Coloured Comic Slipping Slides. Included in the above box.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden, Holborn Viaduct, LONDON

PHOTOGRAPHIC TRANSPARENCIES FOR THE LANTERN.

PLAIN	... ...	1/- each
COLOURED	... ...	1'6 „
„	(very superior) ...	2/6 „

SEVERAL THOUSAND SUBJECTS.

Sold Singly or arranged in Sets, of which a List can be supplied

These Slides are illustrative of the interesting and important features of various Countries. The habits and customs of the people who inhabit them. The history—Zoology, Botany, Geology, &c.—connected with each. Scientific subjects are displayed, including Anatomy and Astronomy among others.

Comic and otherwise amusing subjects. Fairy tales and tales of adventure—in fact, almost all subjects are treated in this pictorial form, whereby audiences of hundreds and even thousands, may at the same moment all gratify sight, and gain instruction.

Catalogue giving the **Titles of the Sets** sent post free.

Catalogue giving subjects of **each slide** composing the sets, price 6d.; Post Free, 8d.

Catalogue of Parisian Lantern Slides sent on loan on client depositing 2s., which amount will be returned when the **book is handed back** to us.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON

"OPTIMUS" OBJECTIVES FOR LANTERN PROJECTION.

These Lenses are of the Petzval Portrait form, and give capital definition.

	£	s.	d.
Mounted in Brass, with Rack Adjustment		12	6
Ditto, ditto, with Flasher		15	0
Ditto, ditto, long focus		36	0
Ditto, ditto, longer focus		46	0
Ditto, ditto, with Flasher, and accommodation for Coloured Glasses for Tinting the Views on the Screen ...		20	0

"OPTIMUS" VARYING FOCUS OBJECTIVE FOR MAGIC LANTERN.



Consists of a Brass Jacket and a series of tubes, each of which fits the jacket exactly, and can be slipped in or out in a moment. Into the tubes Petzval Portrait Combination Lenses—of different foci—are fitted. The operator when about to exhibit, having placed his lantern in a position agreeable to the disposition of his audience, may select and employ the lense tube of such a focus as to project an image upon the screen of the dimensions desired. This system is most necessary to those who exhibit in rooms or halls which vary greatly in length, width and height.

	s.	d.
Price of Jacket fitted with Rack and Pinion Adjustment ...	15	0
Price of Lenses, Photographic Portrait Combination, 4in., 6in., 8in., 10in., 12in. focus ... ... each	15	0

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

"OPTIMUS"

SUPERIOR LANTERN PROJECTION OBJECTIVE.

Perfect Definition. Superlatively Brilliant Illumination. Flat Field.

COINCIDENT FOCI, THEREFORE EQUALLY SUITABLE

FOR

PHOTOGRAPHIC PORTRAITURE.

J. TRAILL TAYLOR

"THE 'OPTIMUS' LANTERN OBJECTIVE. — This lens, by Messrs. Perken, Son & Rayment, has a singularly flat field combined with great brilliance of the image. The corrections by which these properties have been secured have not been obtained at a cost of its utility as a *carte* portrait lens, for the coincidence of the chemical and visual foci, not always found in some lantern objectives, is here perfectly achieved. The form of the combination is essentially that of Professor Petzval's, subject to slight alterations consequent upon the improvements recently effected in optical glass. Although for lantern purposes it works with full aperture, yet it is provided with a case of stops to serve the purposes of copying or ordinary photographic portraiture.

T. C. HEPWORTH

"'OPTIMUS' LANTERN OBJECTIVE.—The image given by this lens is BRILLIANT and it has a WONDERFULLY FLAT FIELD. As the chemical and visual foci coincide, the instrument can be used for portraiture as well as for lantern work."

PRICES.

6 inches Focus,	2 inches	diameter of lens	...	£2	10	0
8½	,,	2⅝	,,	,,	...	4	4	0
12	,,	3⅛	,,	,,	...	5	5	0

Extra Large Diameters for Lantern Projection.

Transmitting increased Light and giving Crisp Images.

6¼ inches Focus,	2⅝ inches	diameter	...	£7	10	0
8½	,,	3½	,,	,,	...	11	0	0

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT 99 Hatton Garden Holborn Viaduct, LONDON

LIME CYLINDERS, FOR LIME-LIGHT, IN AIR-TIGHT TINS.

Best Quality, Soft	per dozen	1 0
,, Hard	,,	1 6
Excelsior Hard	,,	3 0
Best Rubber Tubing, Red or White	per foot	4
Chlorate of Potash Crystals	8d. per lb. ; 14 lb.	8 6
Black Oxide of Manganese...	per lb.	2

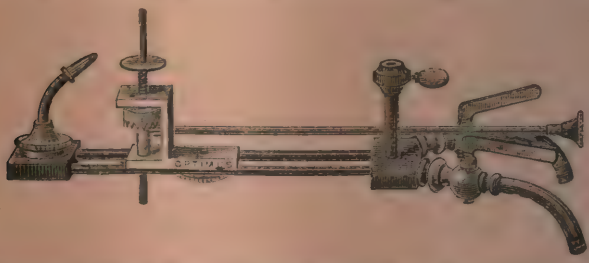
MAGIC LANTERN GAS JETS FOR LIME LIGHT.

Common Blow-through—not guaranteed, 6/6



Best quality Blow-through Gas Jet, with cog-wheel arrangement for turning, also for raising and lowering the lime ; platina nipple, each 11/-

Do. do. with horizontal and vertical centering adjustment ... 25/-



Best mixed Chamber Gas Jet, with cog-wheel arrangement for turning also raising and lowering the lime ; platina nipple ... ... each 16/6

CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

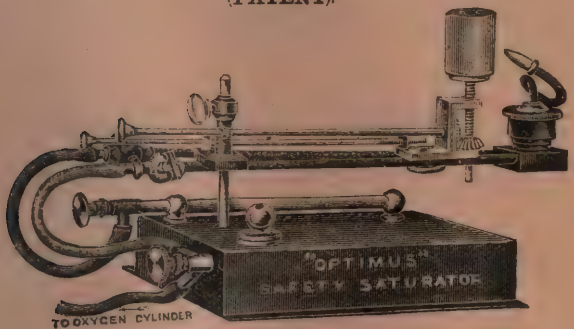
'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON

"OPTIMUS" SAFETY SATURATOR

FOR OPTICAL LANTERN ILLUMINATION.

(PATENT).



ETHO-OXYGEN LIMELIGHT.

WITH (SPECIALLY SUITED) MIXING CHAMBER JET ... **70/-**

FREDERICK E. IVES, of Colour Photography fame, said in a recent address:—"In my opinion the best of these inside lantern Saturators yet produced is that of Perken, Son & Rayment, of London . . It will not become unduly heated in the lantern, as some of the others might, and is a model of compactness and convenience I think so much of it that I have adopted it for my own use.

Extract from *British Journal of Photography.*

A SAFETY ETHER SATURATOR FOR THE LIME-LIGHT LANTERN

We are pleased at being enabled to describe this appliance, which we have seen at work on more than one occasion, and which we believe to be as free from all semblance of danger as we know it to be excellent as a means of illumination.

In the "Optimus" Saturator, the moment the ether has been poured into the filler and screwed down, the taps may be turned on and a light applied to the burner, when the lime will at once become incandescent, and yield a superbly brilliant light.

"Messrs. Perken, Son & Rayment, of Hatton Garden, London, had the honour of displaying their new safety Saturator for optical lantern illumination before the members of the Royal Institution of Great Britain, in Albemarle Street, Piccadilly. Several members of the company present themselves manipulated the instrument, and expressed their great satisfaction at its simplicity and perfect success. The transparent photographs projected on the screen were well illuminated and much appreciated.

STRONGLY RECOMMENDED.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



"OPTIMUS" REFULGENT LAMPS.

BEST LONDON MAKE.

BEARING OUR NAME AND TRADE MARK.

Stout Russian Iron. Burning Mineral Oil.

This lamp has been universally pronounced the *safest* lamp used with the Projecting Magic Lantern and gives brilliant light. A flame sight hole at the back enables the manipulator to adjust the wicks with the nicest accuracy whilst working.

Two wicks (wicks 2 inches wide)	**12/6**
Three wicks	**13/6**
Four wicks	**15/6**

A Lamp made in imitation of the above, which gives fair illumination, we offer as of

BIRMINGHAM MANUFACTURE.

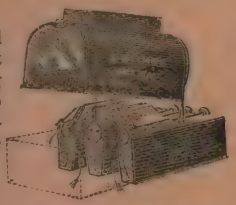
Two wicks (wicks 2 inches wide)	**6/9**
Three wicks...	**7/9**
Four wicks	**8/9**

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99, Hatton Garden Holborn Viaduct, LONDON

Extract from "Nature."—"Lanternists will be glad to learn that Perken, Son & Rayment have introduced a new oil lamp, possessing three times the candle-power of those hitherto used for lantern projection. For small audiences the lamp will suit a lecturer's purpose quite as well as the lime-light."



"OPTIMUS" PATENT 100 CANDLE-POWER LAMP FOR PROJECTION LANTERN.

Price, Three Wicks, two inches wide, with Chimney complete, 25/- each.

Mr. THOMAS BOLAS, *Photographic Work*: "The light certainly surprised us . . the BRIGHTNESS—and above all, the WHITENESS—of the disc, recalling a LIME-LIGHT, while that smell of paraffin which in greater or less intensity, seems the inevitable accompaniment of the oil lantern, could not be noticed."

J. TRAILL TAYLOR, *British Journal of Photography*, said: "Messrs. Perken, Son & Rayment claim to have produced a triple wick oil lamp, in which the luminosity is equal to ONE HUNDRED CANDLE POWER, while the light is very pure, and the heat less than usual. We have been present at trials made with it, and find allegations as to PURITY and INTENSITY OF FLAME are maintained.

Amateur Photographer.—"The 'Optimus' Oil Lamp for Lanterns.—Perken, Son & Rayment of 99, Hatton Garden. With the greater supply of air is combined greater illumination and greater freedom from smell. We have had an opportunity of severely testing the lamp against some of the best ordinary forms, and the increase in illumination is at least three times."

By means of air shafts a greatly increased brilliancy is secured, which has been computed to equal three times—*vide* Report of British Photographic Society, February 24th, 1893—the candle-power of the refulgent lamp hitherto used. These air shafts in promoting combustion create perfect ventilation thereby overcoming the offensive odour so objectional to mineral oil lamps. The colour of the flame is practically white, the lamp, is, therefore, peculiarly suited for enlargements, and as compared with other lamps materially lessens the duration of photographic exposures.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden, Holborn Viaduct, LONDON



PRESSURE GAUGES 30/-

For showing the quantity of gas in the Cylinders have been greatly improved, and are far superior to those generally sold; they are thoroughly tested. All the Steel Cylinders. no matter what size, should register, when full, 120 atmospheres, thus a 6-foot Cylinder, when full, should register 120 atmospheres, when half full 60 atmospheres; a 40-foot Cylinder, when full, will also register 120 atmospheres, and half full, 60 atmospheres. therefore it is easy to calculate quantity of gas in Cylinder.



RELIABLE AUTOMATIC GAS REGULATOR. 20/-

(PATENT.)

These Regulators will automatically regulate the gases from the Bottle and give off an even lesser pressure, so as to place the bottled gases perfectly under control, either for a Triple, Bi-unial or Single Lantern.

Dissolving and effects produced at will without any diminishing of light, and without any alteration of your apparatus (simply regulate your jet taps as if using bags); and when two or three jets are required at the same time the supply is automatically increased without altering the pressure.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



"OPTIMUS"
PATENT SLIDING CARRIER BLOCK.

PRICE ... ... 1s. 6d. each.

Possessed of neither levers nor springs, the "Optimus" Patent Carrier Block is capable of changing the transparency before the optical system of the lantern as speedily as any of its kind. Its individuality and efficiency are very pronounced by the absence of the top bar of the inner frame, which form of construction permits the fingers to freely withdraw the exposed and insert the next transparency

SETS OF EFFECT SLIDES for dissolving view from	per set	4 6
LONG PANORAMA SLIDES, from	each	2 3
Motto Slides, from		1 0
SETS of 10 SLIDES, best rack Astronomy, 2½ inch circles in mahogany box		100 0
Ditto ditto in 3 inch ...		110 0
SQUARE WOOD BLOCKS	per gross	42 0
FRONT LENS FOR LANTERN, rack motion, double achromatic photographic combination ...		15 0
Ditto ditto long focus ...		36 0
Ditto ditto longer focus ...		46 0
GAS JETS—		
Blow Through		11 0
Chamber		16 6
Interchangeable		18 6
GAS BAGS, GAS CYLINDERS, at Lowest Market Prices.		
HARD LIMES of great durability, in sealed tins, per doz.		1 6
SOFT LINES		1 0

MAGIC LANTERN SLIDES IN GREAT VARIETY.

Apply for Catalogue of Lantern Slides, 6d.

LIME TONGS	1 0

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden / Holborn Viaduct, LONDON



COMIC SLIPPING SLIDES.

600 DIFFERENT SUBJECTS ... ... each 1s.
Well painted, giving brilliancy and transparency of colour on the screen.

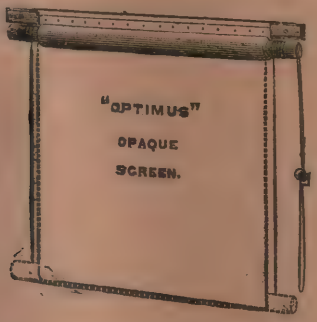


CHROMATROPES, 3 in. dia., best quality (various designs)	each	9 0
Do. 3 in. dia., with Photographic Portraits, Mottoes, Views, etc., in centre	,,	10 0
CHROMATROPE CARRIER FRAME, with 6 Pairs of Painted Discs in rack box	,,	21 0
RACKWORK SOLDIERS' HEADS, changing to Donkeys' heads	,,	8 6
SNOWSTORM EFFECT	,,	7 0
CURTAIN to roll up, showing Painted Curtain or Drop Scene	,,	10 0
DANCING SKELETON SLIDE, with lever motion taking off Head	,,	5 0
LIGHTNING EFFECT	,,	1 9
RAINBOW EFFECT	,,	1 9
LEVER MOON RISING EFFECT	,,	6 6
MAN SWALLOWING RATS, rack mills, etc. ...	,,	10 0
RACK WORK, best painted wave slides	,,	15 0

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON



"OPTIMUS" PURE WHITE LANTERN SCREEN.

MOUNTED ON

A STRONG WOOD TOP FRAME,

WITH WHEEL PULLEY & CORD, ALSO A BOTTOM ROLLER

Complete—

Feet Sq.	4	5	6	7	8	9	10	12	15
	16/-	18/-	20/-	22/6	25/-	28/-	35/-	62/-	90/-

The above is specially recommended as a thoroughly practical and satisfactory arrangement.

THEATRICAL LIME LIGHT BOXES.

Light Box, fitted with Burner, 6in. Lens and four Coloured Squares	£2 0
Light Box, fitted complete on Stand, with 6in. Lens, 6in. focus, Revolving Disc, and four Coloured Mediums and Burner	2 10
Light Box, fitted complete on Stand, with five Coloured Mediums, and 7in. Lens, 7in. focus	3 0
Light Box, fitted complete on Stand, with five Coloured Mediums, and 8in. Lens, 8in. focus	4 10
Light Box, fitted complete on Stand, with five Coloured Mediums, and 9in. Lens, 18in. focus	4 12

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON



TRANSPARENT SCREENS. BEST UNION.

Feet Square—

5	6	7	8	9	10	12	14	15	16	17½	20	24
5/-	7/-	9/-	11/-	13/-	15/-	22/-	31/-	33/-	37/-	42/-	50/-	84/-

PORTABLE STANDS FOR SCREENS.

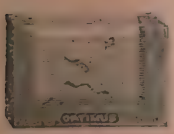
Packed in Boxes with Space for Screens.

Feet Sq.	8	9	10	12	14	16	18	20
	30/-	33/-	37/-	38/-	49/-	48/-	56/-	64/-



"OPTIMUS" LECTURER'S PORTABLE READING LAMP.

Price of Lamp, with Signal, Bell, and Match Box, complete ... ... each 8/-



ANIMALCULÆ OR CHEMICAL TANK.

Circular ... 3/6 Square ... 4/-

These being made of Glass and India-rubber are not affected by chemicals.

CATALOGUES POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

"OPTIUMS" BIUNIAL LANTERN.

For Oxy-Hydrogen Lime Light.

The Top Lantern may be used with Oil Lamp.

Seasoned Mahogany Body, 4 Panelled Doors with Sight Holes, Moulded Foot picked out with black, Japanned Stages and Tubes, Achromatic Photographic Front Lenses. Compound Condensers of 4 inches diameter	£7 7 0
Ditto. Ditto. with highly-finished BRASS Stages, and Sliding Tubes	10 10 0

"OPTIMUS" TRIPLE OXY-HYDROGEN LANTERN.

The Top of the Lantern may be used separately with Oil Lamp.

Seasoned Mahogany and Rosewood Body, 6 Panelled Doors with Sight Holes, Moulded Foot, Highly Finished Brass Stages and Sliding Tubes. Compound Condensers, 4 inches diameter, Three-draw Telescopic Front Tubes, and SIX Photographic Front Lenses of 6 in. and 4 in. focus	30 0 0
Three Safety Gas Jets	1 13 0
"OPTIMUS" Triple Dissolving Tap (Patent) ...	1 13 0
	£33 6 0

"OPTIMUS" Bi-Unial, similarly constructed and fitted	20 6 0
Two jets	1 2 0
Six-way Dissolving Tap	0 17 0
	£22 5 0

The Draw Tubes are specially rigid, so maintaining the Optical Axis accurately and ensuring the Front Lens, Condenser, and Slide occupying parallel planes.

Curtain Slide, extra, 7s. Double Pinion, extra, 3s.

Lantern Photographs ... Plain, 1s. ... Coloured 1s. 6d. each

CATALOGUE POST FREE. DISCOUNT TO THE TRADE

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

"OPTIMUS" MICROSCOPES.



THE "OPTIMUS" SCHOOL MICROSCOPE. £ s. d.

Highly finished, bronzed foot, sliding coarse adjustment, fine adjustment by milled head, ¼in., ⅛in., and 1in. dividing objective, one eye-piece and condenser, in upright mahogany case, with drawer for objects 2 15 0

THE "OPTIMUS" STUDENT MICROSCOPE.

Rack coarse adjustment with double milled heads, fine adjustment, revolving stage, concave mirror, ¼in., ⅛in., and 1in. dividing objective, one eye-piece, live cage, hand and stage forceps, in mahogany box (as above) with lock and key, and handle ... 3 6 6

THE "OPTIMUS" UNIVERSITY MICROSCOPE.

As above, but having stage plate with Universal motion, stand condenser, and revolving diaphragm 4 4 0

THE "OPTIMUS" COLLEGE MICROSCOPE.

Flat brass foot and movable stage plate, rack and fine adjustment, ⅔in. and ¼in. objectives, two eye-pieces, stand condenser, and accessories, in mahogany upright case with lock and key 5 10 0

THE "OPTIMUS" UNIVERSAL MICROSCOPE.

Full-size Monocular Microscope, best quality, rack and pinion, coarse adjustment, lever screw, fine adjustment giving most delicate motion, 1in. and ¼in. objectives, two eye-pieces, Universal hand motion to stage, revolving diaphragm, stand condenser, live cage, forceps, in upright mahogany cabinet, with drawer for objects, lock and key 7 7 0

THE "OPTIMUS" POPULAR MICROSCOPE.

Full-size Monocular Microscope and apparatus (as above), with vertical and horizontal movement, rack and pinion to stage .. 8 18 0

THE "OPTIMUS" PORTABLE MICROSCOPE.

Best quality, coarse and fine adjustments, two eye-pieces, 2in., ½in., and ⅛in. objectives, stand condenser, live cage, forceps, in polished mahogany case (as above) 10 10 0

CARL REICHERT'S Microscopes and Objectives.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON



SUPERIOR ASTRONOMICAL TELESCOPES.

WITH STAR FINDER.

On Brass Claw Table Stand, fitted with Rack and Pinion Movements—one for Focussing Adjustment, the other for Vertical Adjustment. A lateral or rotating action (very free from vibration) is also provided for. Supplied in outside Box with Lock and Key.

Diameter of Object Glass in Inches.	Magnifying Power of Terrestrial Eyepieces in Diameters.	Magnifying Power of Celestial Eyepieces in Diameters.	Price. £	s.	d.
2½ ...	40 ...	85 ...	10	0	0
2⅝ ...	45 ...	95 ...	12	0	0
3 ...	50 & 60 ...	75 & 150 ...	15	0	0
3¼ ...	55 & 75 ...	90 & 160 ...	19	0	0
3½ ...	68 & 80 ...	100 & 175 ...	24	0	0
3⅝ ...	65 & 85 ...	85 140 240 ...	29	0	0
4 ...	70 & 90 ...	90 145 250 ...	36	0	0
4¼ ...	75 & 95 ...	100 150 270 ...	40	0	0
Mahogany Garden Stand, extra			1	15	0
Ditto with Rack Adjustment for Elevating and Depressing			4	4	0

CATALOGUES POST FREE. DISCOUNT TO THE TRADE

'OPTIMUS'

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON

"OPTIMUS" ACHROMATIC TELESCOPE.



Diameter of Object Glass—	Inches. 1		$1\frac{3}{16}$		$1\frac{7}{16}$		$1\frac{11}{16}$		2	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Morocco covered bodies— Brass Mounts, 3 Draws ...	5	9	8	0	15	0	21	0		
Ditto. with Spray or Sun Shades	7	0	10	6	17	6	23	0		
"Tourist" Morocco covered bodies— Oxidised Mounts, 3 draw Cap and Sun Shades ...			15	6	23	0	30	0	41	0
"Army" Morocco covered bodies— Oxidised Mounts, 4 draws ...			31	0	41	0	58	0	72	0
"Navy" or "Day and Night" Morocco covered bodies— 1 Draw with Shades ...			30	0	41	0	60	0	82	0
"Government" Morocco covered bodies— Pancratic, 3 draws with Shades			42	0	54	0	72	0	90	0

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'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct, LONDON

"OPTIMUS" ROYAL OPERA GLASS.



WITH LONG TELESCOPIC HANDLE.

"Optimus" Opera, Field, and Marine-glasses are all fitted with Achromatic Lenses. No inferior instruments stocked. All are supplied in cases.

These instruments are most elegant in appearance, and, at the same time, light, portable, and of the highest optical perfection. The handle slides telescopically into half its maximum length, and can be carried in the silk plush satchel supplied with it.

Body covered with Morocco, with Bronzed, Nickelled, or Gilt Mounts	42/-
Body of Embossed Aluminium	84/-
" Tortoise Shell and Aluminium ...	90/-
" Ornamental Pearl and Aluminium ...	90/

"OPTIMUS" DWARF OPERA.



A small but efficient instrument. Can be conveniently suspended by a thin cord around the neck. Always ready for use.

Black Morocco and Japanned Metal Body ...	15/-
Polished Aluminium Body	30/-
Tortoise Shell or Fancy Pearl Body	35/-

"OPTIMUS" GUINEA OPERA GLASS.



Covered with Morocco, fitted with powerful and very Clear Glasses 21/-

"OPTIMUS" FAVOURITE OPERA,



With Russia Leather or Morocco Covered Body as preferred. Combining the maximum of power and definition with the greatest possible visual angle required for theatre use.

Diameter of Object Glasses 1¼in. ...	30/-
" 1⅜ " ...	40/-
" 1⅝ " ...	50/-

Aluminium and Morocco Body Opera-glasses of the very finest finish and optical excellence.



Diameter of Object Glasses 1 in. ...	30/-
" 1¼ " ...	45/-
" 1½ " ...	60/-
" 1⅝ " ...	75/-
" 1¾ " ...	100/-

Ornamental Inlaid or White Pearl Opera-glasses, mounted in Aluminium, or best Gilt Metal, from 25/- to 200/- In fancy velvet cases.

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'OPTIMUS'

PERKEN, SON & RAYMENT, 99 Hatton Garden Holborn Viaduct LONDON

"OPTIMUS" BINOCULAR TELESCOPES.

MOST PORTABLE

Adjustment to suit any sight and width of eyes.

20 MILES RANGE.



SIXTEEN LENSES.

EXTREME POWER.

LARGE FIELD OF VIEW.

"Optimus" Binocular or Twin Telescopes are specially recommended for use at long distances on sea and land. They are from two to five times as powerful as ordinary field-glasses and, on that account, will take the place of a long single telescope. In addition they are much easier to use, and are sufficiently portable to be carried in the pocket. Those with Aluminium Mountings are about one-third the weight of ordinary metal.

		Length Shut.	Length Open.	Dia. of O. G.	Mag Power.	Price.		
					Diams.	£	s.	d.
No.	1.—Morocco covered, no shades	5¾in.	8⅝in.	⅞in.	11	4	0	0
,,	2.—Ditto with sunshade...	6¼	8¾	1 1/16	12	5	0	0
,,	3.—Ditto ditto ...	7	9¼	1⅛	13	6	5	0
,,	4.—Ditto ditto ...	8	10¾	1½	18	6	15	0
,,	5.—Ditto ditto ...	8½	11½	1 11/16	19	7	5	0
,,	6.—Ditto ditto ...	10	13½	1⅞	25	10	0	0
No.	1.—Bright Aluminium Mountings, covered Russian Leather ...	5¾	8⅝	⅞	11	8	0	0
,,	2.—Ditto ditto ...	6¼	8¾	1 1/16	12	10	0	0
,,	3.—Ditto ditto ...	7	9¼	1⅛	13	12	0	0
,,	4.—Ditto ditto ...	8	10¾	1½	18	13	5	0
,,	5.—Ditto ditto ...	8½	11½	1 11/16	19	14	18	0
,,	6.—Ditto ditto ...	10	13½	1⅞	25	20	15	0

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'OPTIMUS'

PERKEN, SON & RAYMENT, 99, Hatton Garden Holborn Viaduct, LONDON

All "Optimus" Field, Marine, and Opera Glasses have Achromatic Lenses Inferior Instruments are not offered in this Catalogue.

Each is Supplied in a Superior Case.

"OPTIMUS" SCORER.



Is unrivalled for excellence and cheapness. It shows the number of people in Boats four miles distant, Sea Birds one mile distant, and Bullet Marks on Target at 600 yards. Height, when closed, 3¾ ins. — **30 -**

With Aluminium Body **45/-**

"OPTIMUS" MARKSMAN.



Unsurpassed for brilliancy of definition.

Comprehending a very wide angle of view, and giving high magnifying power ... ... — **60/-**

With Aluminium Body **84/-**

"OPTIMUS" SCOUT.



Medium size. Clear definition. Good field of view. Target Marks 1200 yards. Magnifying 64 times ... — **70/-**

With Aluminium Body **110/-**

For General Excellence, Definition, and Magnifying power, we invite intending Purchasers to test our Field and Opera-glasses against any in the world.

OPERA-GLASSES IN GREAT VARIETY.

CATALOGUE POST FREE. DISCOUNT TO THE TRADE.

'OPTIMUS'

PERKEN, SON & RAYMENT, 99½ Hatton Garden, Holborn Viaduct, LONDON

"OPTIMUS" SPECTACLES.

OCULISTS' FORMULÆ ACCURATELY AND PROMPTLY EXECUTED.



ORDINARY FRAME.



PANTOSCOPIC FRAME
for those who need spectacles for reading only, the wearer can look over the top at distant objects.



HOOK SIDE FRAME
for Walking or Riding

The same price is charged for either shape. When possible it is preferable to see the wearer and to measure the face, so that the frame may be of correct width between the eyes, properly adjusted to the shape of the nose, &c., &c.

The frames are of pliable steel, either blue or straw-colour. If desired nickel frames are supplied at an extra cost of one shilling. These are non-corrosive.

Prismatic, cylindrical and sphero-cylindrical lenses, extra according to focal working from 2s. to 4s.

Frames for Hospital Patients, with Concave or Convex Glasses	...	2
" Superior Quality " " " ...	...	3
" Extra Superior Quality " " " ...	...	5
" Best possible " " " ...	...	7

GOLD SPECTACLES OF EITHER SHAPE SHOWN ABOVE.

10c. Light Weight, including Concave or Convex Glasses	..	21
12c. Medium .. " .. " ..	..	25
10c. Heavy .. " .. " " ...	...	30
12c. Light .. " .. " ...	...	25
15c. Medium .. " " " ...	...	35
15c. Heavy .. " " " ...	...	45
18c. Light .. " " " ..	..	35
18c. Medium .. " " " ..	...	45
18c. Heavy .. " " " ..	...	55

Glasses tinted either Blue, Smoke, or Green at same prices as White.

Pebbles, Best Quality, extra 3

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'OPTIMUS'

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON



JAPANESE.



CANADIAN..



ASTIGMATIC.

"OPTIMUS" FOLDERS (FOLDING EYE GLASSES)

The same price is charged for either of these styles or fashions of ders—

or Hospital Patients	2 0
uperior Quality	3 0
xtra Superior Quality	5 0
ery Best Possible	7 6

GOLD FOLDERS OF EITHER SHAPE SHOWN ABOVE.

c. Light Weight, including Glasses	21 0
c. Medium ,, ,, ...	25 0
c. Heavy ,, ,, ...	30 0
c. Light ,, ,, ...	25 0
c. Medium ,, ,, ...	35 0
c. Heavy ,, ,, ...	45 0
c. Light ,, ,, ...	35 0
c. Medium ,, ,, ...	45 0
c. Heavy ,, ,, ...	55 0

pherical & Plano Glasses tinted either Blue, Smoke, or Green at same prices as White.

razilian Pebbles, Best Quality, extra 3 0

-EYE, OR HORSESHOE SPECTACLES

ave coloured glasses in front and at the sides the eyes, so giving extra protection from rong glare of light 5 0
Do. do. best possible 7 6



EYE PRESERVERS

ith wire shades and coloured glasses, the sides which are worked flat or parallel for weak es of normal vision 5 0



DOCTOR BOWMAN'S GOGGLES

ith coloured glasses. The sides are worked flat r parallel and shaped like a shallow cup, in- nded for eyes of normal vision exposed to strong lare of light. Suitable for foreign travel, sea oyages, or sandy countries 10 6



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'OPTIMUS'

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON

Christiania, 1889.

***Messrs. Perken**, Son and Rayment,*

99, Hatton Garden, London.

Gentlemen,

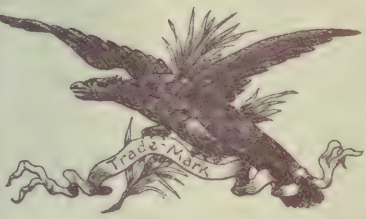
Having lately returned from Greenland after my Expedition last year across the Inland Ice, I have great pleasure in now informing you, that the Instruments supplied by you for the Expedition, namely the three Aneroids, and the pocket Sextant, have been proved to my entire satisfaction.—Time not allowing the Aneroids to be verified at the Kew Observatory as intended, I had this done at the Meteorological Institute here, with the most satisfactory results as to their correctness, and although the necessarily severe usage and tests to which, from the rather unexpected high altitude of upwards 9,000 feet reached, and the great change of temperature, varying from + 55 to — 55 Fh. in the day and night, they were exposed, yet they worked admirably together, and on again reaching the sea level, they differed but very slightly.—The pocket Sextant also, the only instrument we had for fixing our latitudinal position, proved invaluable to us, and justified fully the excellent workmanship and finish.

I am, Gentlemen,

Your obedient servant,

(Signed.) **FRIDTJOF NANSEN.**

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Manufacturers
of
Photographic Boards
and
Mounts

PRAGER & OJDA



Medalled:
Chicago 1893, Berlin 1892.
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Friedrich-Str. 236,

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Mounts

of all sizes and styles viz:

Lithographic-Printing-artistic designs-in bronze or Colour.

Real Gold Leaf, Silver,-Gilt,-Fancy Gilt,-Colour,-White-Plain-Stamping or Embossing

With Real Gold,-Silver,-Gilt,-Fancy Gilt,-Colour,-Flat or Bevelled Edges,

greeque and scolloped edges.

PRAGER

Manufacturers of Photo



Friedrich-Str.

LOUDA

c Boards and Mounts.



BERLIN, S.W.

Boards
of all sizes
from 6 by 8 inches
to 36 by 39 inches.

Oxford lines.
India tinted Mounts
Pasted Tint Mounts
Plate Sunk Mounts

Platinotype Mounts
the most various
styles.

Mascs and Discs
Cases
Enveloppes
Ferrotypes
&c. &c.

PRAGER & LOJDA

Manufacturers of Photographic Mounts and Boards.



Factory at Friedrich-Str. 236, BERLIN, S.W.

GOLD MEDAL INTERNATIONAL INVENTIONS EXHIBITION.
SPECIAL SILVER MEDAL LEEDS EXHIBITION, 1895.



PHOTOGRAPHIC

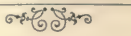
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FOR EVERY DESCRIPTION OF

Commercial and Book Illustration.



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LIMITED,
Photographic Art Printers and Engravers,
FINSBURY WORKS,
LONDON, E.C.



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GOLD MEDAL INTERNATIONAL INVENTIONS EXHIBITION.
SPECIAL SILVER MEDAL LEEDS EXHIBITION, 1895.

Photo-Zincography,
Photo-Lithography,
Photo-Mechanical Printing.

WATERLOW & SONS
LIMITED.

Photographic Art Printers and Engravers,

FINSBURY WORKS, LONDON, E.C.

Collotype.—*Hand and Machine Printing for Art Publications, Scientific and Antiquarian Periodicals, Machinery, Landscapes, Portraits, Pottery, Furniture Designs, Trade Advertisements, Special Collotype Prints on Glazed Enamelled Paper for Views and View Books, &c. The superior results given by this process, and the rapidity and cheapness by which the prints are produced, together with the advantage of printing with or without margins, place it in the first rank of processes for commercial purposes.*

Chromo-Collotypes.—*Photo-Chromic reproductions (colour photographs) of Views and Landscapes, admirably adapted for views of Seaside and Holiday Resorts.*

Woodbury Prints.—*High-class Permanent Copies, equal in appearance to the Best Silver Prints, of Portraits, Landscapes, Furniture, Pottery, &c. Prints may be obtained in almost any colour from Customers' own Negatives, or from the original Objects. These reproductions are specially suitable for Portrait Work, and are valuable for every description of Artistic or Commercial Illustrations.*

WATERLOW & SONS LIMITED, FINSBURY WORKS, E.C.



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GOLD MEDAL INTERNATIONAL INVENTIONS EXHIBITION.
SPECIAL SILVER MEDAL LEEDS EXHIBITION, 1895.

Photo-Zinco Blocks.—*Zinc Blocks of line subjects for Letterpress Printing of the finest quality for artistic or commercial illustration.*

Half-Tone Blocks.—*On Solid Copper in Graded Tints, suitable for every kind of illustration.*

Photogravure Plates and Printing.—*By the best modern processes for portrait and general book illustration.*

Heliochrome Plates and Printing.—*Extensive additions (including the purchase of the plant and materials of the Heliochrome Company) have been made to the premises of W. & S. Ltd. for Heliochrome Printing, and they are in a position to rapidly execute orders for the supply of fac-simile copies in colours of Oil and Water-Colour Paintings, Art Fabrics, Colour Advertisements, and the finest colour work for Art Magazine or Catalogue Illustration.*

Please see example of Heliochrome Printing facing page 764. These plates are made direct from the object.

The greatest care and skill is employed in the working of these Processes, and the results are the finest which it is possible to obtain.

The new and extensive Photographic Works being fitted with Modern Appliances, Machinery, Electric Lighting, &c., rapid and accurate work is always obtainable, irrespective of weather or season.



PRICE LISTS, ESTIMATES, AND FULL PARTICULARS ON APPLICATION.



WATERLOW & SONS LIMITED, FINSBURY WORKS, E.C.

ESTABLISHED 1756.

VOIGTLÄNDER & SOHN,

BRUNSWICK, LONDON & BOSTON (MASS.),

ABRIDGED CATALOGUE OF

Petzval Portrait,
Symmetrical Portrait,
Wide Angle Portrait,
Telephotographic,
Euryscope, & Collinear

PHOTOGRAPHIC LENSES.

SOLE PROPRIETOR:

FRIEDRICH RITTER VON VOIGTLÄNDER.

SCIENTIFIC DIRECTORS:

Dr. D. KAEMPFER. Dr. A. MIETHE,
Hon. F.R.P.S.

Voigtländer's Lenses are obtainable from all Photographic Dealers.

London Branch (Wholesale only): 92, HATTON GARDEN, E.C.

SHORT HISTORY

VOIGTLÄNDER & SOHN.

THE firm was founded in 1756 by Christoph Voigtländer. In 1811 his son, Friedrich Voigtländer, constructed the first binocular field glasses. The third owner of the firm, Friedrich Voigtländer, carefully studied Frauenhofer's methods of examining glasses used for optical purposes and, with a spectrometer, made by himself, obtained the optical data of all the kinds of glass then manufactured. He made use of this with the greatest success, as it enabled him to tabulate practical data for the calculation of optical instruments. He handed these data to the Mathematician, Professor Petzval, of Vienna, asking him to calculate a photographic double objective. According to the calculations Professor Petzval supplied, Friedrich Voigtländer brought out, in 1839, the first photographic doublet, the well-known Petzval Portrait Lens. These Lenses, owing to their rapidity, first enabled satisfactory Photographs to be taken of living objects. They were so different from any Optical system previously constructed, that they became the basis of an entirely new class of optical instruments.

The fourth and present owner of the firm, Friedrich Ritter von Voigtländer, constructed, in 1877, the first Euryscope Lenses, which gave a large flat field with much more light than previously obtainable. These Lenses having become rapidly popular various successive series were constructed. The advantages of symmetrical Lenses suggested also improvement in portrait Lenses, and, in 1883, the long focus portrait Lenses were replaced by symmetrical Portrait Euryscopes, Series II. & III.

Until recently very few kinds of glass were available for optical purposes, but, in 1886, the Glass Technical Laboratory, of Professor Abbe and Dr. Schott, in Jena, brought out a number of new glasses which influenced the optical industry in a similar manner though to a much greater extent than Frauenhofer's seven glass-fusions. Voigtländer and Sohn were the first opticians to make use of this extension of Optical means as regards Photographic Lenses, and, in 1888, they improved all their symmetrical Lenses, which, until then, had contained two flint glasses and replaced the latter by two extremely transparent crown glasses. The Wide Angle Euryscopes and single Landscape Lenses were entirely reconstructed.

The Collinear Lenses, introduced in 1894, were in 1896, almost reconstructed, with the result that they now combine a larger aperture and covering power with freedom from astigmatism. They are made in three Series with apertures, F5·6, F7·7 and F11·3.

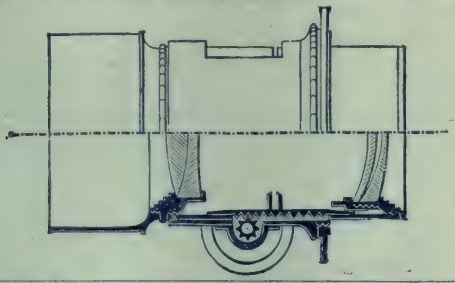
In the 142 years of its existence the business has steadily increased. The latest methods of manufacture and the best modern machinery are used. The works in Brunswick were rebuilt in 1893 and are complete in every respect with steam-power, and own Electric Light Installation. The workshops are large and well heated and ventilated. No apprentices are kept and all the work is done by experienced men who receive pensions amounting to from half to two-thirds wages after being with the firm a certain time. There is a large Studio (over 100 square yards), with dark room, for testing Photographic Lenses, and a long, well-lighted room (over 120 square yards), for testing Field-glasses, Telescopes, etc.

Grinding Lenses is done only by machinery, but nearly all Lenses are polished by hand with the greatest care, thus avoiding undue heating of the glass during this process.

PORTRAIT LENSES.

SERIES I. Full Aperture F3·16.

Extremely Rapid, Petzval form improved with Jena glass.



No.	Equivalent Focus. mm.	inches.	Suitable for	Standard Size Plates.	Diameter of Light Circle.	Price.	
3	174	6⅞	C.d.v. Bust	5×4	7	£6 0 0	With Rack & Pinion.
4	209	8¼	,,	6½×4½	9	9 0 0	
5	245	9½	Full Lgth. & Busts	8×5	11	13 0 0	
6	306	12	Cabinet	8½×6½	13	18 0 0	Without Rack and Pinion.
7	395	15½	Boudoir	10×8	16½	24 0 0	

SERIES II. Full Aperture F4.

Symmetrical form giving brilliant sharply defined image.

No.	Equivalent Focus mm.	inches.	Suitable for	Standard Size Plates.	Diameter of Light Circle.	Price.	
3	202	8	C.d.v.	6½×4¾	8¼	£6 10 0	With Rack and Pinion
4	263	10⅜	,,	8×5	11	9 10 0	
5	309	12¼	Cabinets	8½×6½	13	13 0 0	
6	378	15	,,	10×8	15	18 0 0	Without Rack and Pinion.
7	470	18½	Boudoir or Imperial	12×10	11½	24 0 0	

SERIES III. Full Aperture F4½. Angle of View 56°.

These Instruments give a larger field of view and greater depth of definition than any other Portrait Lenses. They are rapid, and being symmetrically constructed, the definition is sharp and image brilliant, owing to the smaller number of reflecting surfaces.

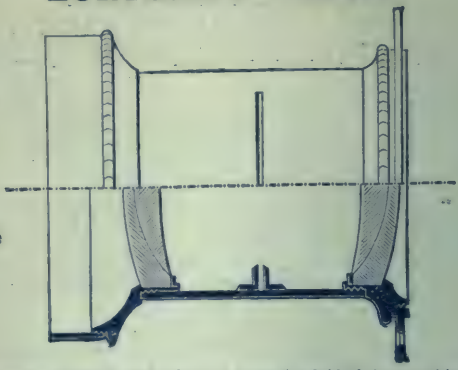
No.	Equivalent Focus. mm.	inches.	Suitable for Plates.	Diameter of Light Circle.	Price. Without Rack & Pinion.	With Rack & Pinion.
1	163	6½	5×4	7	£4 10 0	£5 10 0
2	198	7⅞	6½×4¾	8½	5 10 0	6 10 0
3	217	8½	7½×5	9½	7 10 0	8 0 0
4	286	11¼	8½×6½	12	10 0 0	11 0 0
5	344	13⅝	8½×6½ or 10×8	15	14 0 0	16 0 0
6	412	16¼	10×8 or 12×10	16½	20 0 0	—
7	514	20¼	15×12	20	26 0 0	—
8	658	26	18×16	25½	47 10 0	—

Voigtländer & Sohn, Brunswick and London.

EURYSCOPE LENSES.

SERIES IV.

Full Aperture F·63,



Angle of View 70°.

These Instruments, owing to their relatively extensive field of view, combined with depth of definition and rapidity, have been extensively used for almost every class of Photographic work.

Very good portraits and groups can be taken in the Studio, specially with the larger sizes, and for this purpose they can be used with full aperture. Their rapidity is so great that very short exposures can be given for outdoor and Hand Camera work. They are also efficient for landscapes and general objects.

No.	Equivalent Focus.		Suitable for Plates.	Diameter of Circular Image.	Price. Waterhouse. Diaphragms.			Iris.		
	mm.	inches.	inches	inches.	£	s.	d.	£	s.	d.
0	127	5	4½×3½	8	3	0	0	3	10	0
00	174	6⅞	6½×4¾	10½	4	0	0	4	10	0
1	216	8½	7½×5	12½	5	0	0	5	12	0
2	254	10	8½×6¾	15	5	16	0	6	8	0
3	291	11½	8½×6½ or 10×8	16½	7	0	0	7	12	0
4	382	15	10×8	20	10	0	0	10	12	0
5	448	17½	12×10	24½	15	0	0	16	0	0
6	547	21½	15×12	29	20	0	0	—		
7	655	25¾	18×16	34½	26	0	0	—		
8	852	33½	24×18	44	47	10	0	—		
9	1070	42¼	27×23	53	112	0	0	—		

MEDIUM RAPID EURYSCOPES. Series VI.

Full Aperture F7·7. Angle of View 78°.

These Lenses though rapid have not so large an aperture as the preceding ones but exceed them in depth of definition and angle of view. They are among the best all round Lenses and will be found most useful for Groups, Landscapes, Copying and Architectural Work. The back Lens can be used alone as a single Lens of about double the focal length of the combination.

No.	Equivalent Focus.		Suitable for Plates.	Diameter of Circular Image.	Price. Waterhouse. Diaphragms.			Iris.		
	mm.	inches.	inches.	inches.	£	s.	d.	£	s.	d.
x	145	5⅝	4½×3½ or 5×4	11	3	0	0	3	10	0
0	178	7	6½×4¾ or 7½×5	13	3	8	0	3	18	0
00	240	9½	7½×5 or 8½×6½	16	4	4	0	4	14	0
1	295	11½	9×7	19	5	12	0	6	4	0
2	358	14	10×8	22	6	12	0	7	4	0
3	421	16½	12×10	25	8	0	0	8	12	0
4	500	19¾	15×12	28	12	0	0	12	12	0
5	609	24	18×16	34	17	12	0	18	12	0
6	724	28½	24×18	40	23	0	0	—		
7	869	34	27×23	47	30	0	0	—		
8	1080	42½	31×27	59	55	0	0	—		

Voigtländer & Sohn, Brunswick and London.

New Series.

COLLINEAR LENSES.

These Lenses have been recently remarkably improved, and are now much more efficient than the original series. They consist of symmetrical back and front combinations, each of which consists of three lenses cemented together ; they can also be supplied non-symmetrical. They give an anastigmatic, sharp and flat field, with a wide angle and great rapidity. The results are remarkable, as the image is almost geometrically exact ; for this reason the name Collinear has been given to them. The ratio of Diaphragms to each other is according to the Standards fixed by the Royal Photographic Society.

COLLINEAR LENSES. Series II.



Full Aperture F5·6.

These Lenses are extremely suitable for Hand Cameras, Instantaneous Pictures, Animals, Studio Work, especially Groups in the Studio.

No.	Equivalent Focus.		Sizes of Plates Sharply Covered. F6·3	F8.	F32.	Price, with Iris.		
	mm.	inches.	inches.	inches.	inches.	£	s.	d.
1	90	3½	3¼ × 3¼	4 × 3	4¼ × 3¼	4	16	0
2	120	4¾	4¼ × 3¼	6½ × 4¾	7 × 5	5	12	0
3	150	5⅞	6½ × 4¾	7½ × 5	8¼ × 6½	6	8	0
4	200	7⅞	7 × 5½	8 × 6	10 × 8	8	12	0

Full Aperture F6·3.

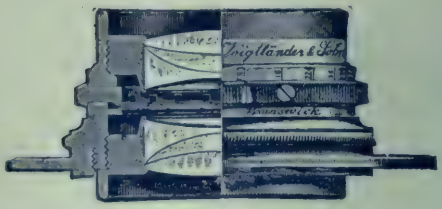
Suitable for Instantaneous Photographs and Portraits and Groups in the Studio or out of Doors, Large Heads and all round work.

No.	Equivalent Focus.		Sizes of Plates Sharply Covered. F6·3.	F8.	F32.	Price, with Iris.		
	mm.	inches.	inches.	inches.	inches.	£	s.	d.
5	250	9⅞	8 × 6	8½ × 6½	10 × 8	11	0	0
6	300	11¾	8¼ × 6½	9 × 7	12 × 10	15	0	0
7	370	14½	9 × 7	10 × 8	15 × 12	20	0	0
8	430	17	10 × 8	12 × 10	18 × 16	27	0	0
9	510	20	11½ × 9½	15 × 12	24 × 18	34	0	0
10	600	23⅝	15 × 12	18 × 16	27 × 23	45	0	0

Voigtländer & Sohn, Brunswick and London.

COLLINEAR LENSES.

WIDE ANGLE TYPE.

SERIES  IV.

Full Aperture, Nos. 1 to 5, F11·3.

Full Aperture, Nos. 6 to 10, F12·5.

For Reproductions, Copying, Architecture, Interiors, etc., this is the first series of Symmetrical Anastigmat Wide Angle Lenses made in small as well as large sizes. With full Aperture a field of 75° is perfectly sharp, and with smaller stops up to over 90°, and in this large field no trace of astigmatism or unevenness can be found. The following sizes of plates, as in the case of Series II., III., are by no means the maximum. In most cases much larger plates will be covered sharply. If a too short focus lens is used, the perspective is not so good. The definition obtainable is extremely sharp.

No.	Equivalent Focus.		Size of plate sharply covered. F11·3.	F32.	F64.	Price with Iris.
	mm.	approx. inches.	ins.	ins.	ins.	£ s. d.
1	100	4	4½ × 3¾	6 × 4	6½ × 4¾	4 0 0
2	120	4¾	6 × 4	7 × 5	7½ × 5½	5 0 0
3	150	6	7½ × 5	8 × 6	9 × 7	5 0 0
4	200	8	9 × 7	11 × 9	12 × 10	6 0 0
5	260	10¼	11 × 9	12 × 10	15 × 12	9 0 0
			F12 5.			
6	320	12¾	12 × 10	15 × 12	17 × 12¾	12 0 0
7	440	17½	15 × 12	18 × 16	22 × 18	20 0 0
8	600	23¾	18 × 16	24 × 18	23 × 19	30 0 0
9	800	31½	24 × 18	27 × 23	27 × 27	45 0 0
10	1000	39½	27 × 23	31 × 27	35 × 31	63 0 0

Voigtländer & Sohn, Brunswick and London.

NON-SYMMETRICAL LENSES.

We can supply our Collinear Lenses with front and back lens of different foci, thus combining in one instrument two single lenses and one doublet, working at from F7·2 upwards. We would specially state that these combinations are thoroughly efficient instruments. They are much more portable, and take up less room than three separate lenses. We should be glad to quote for these non-symmetrical lenses.

We can specially recommend combinations formed of Collinear Series IV., and give the following as an example. The single lens when used on plates suitable for the doublets show scarcely any distortion, and can be used for Architectural work; for instance, no distortion can be seen over 10×8 plate with 16 in. focus single lens of this series.

COLLINEAR SERIES IV.

	Largest Diaphragm F.	Size of Plate sharply covered. Full Aperture.	Small Stops.	Price. £ s. d.
		inches.	inches.	
Single Lens, 11½ inches focus	22·6	12 × 10		5 10 0
" " 16½ " "	22·6	15 × 12		
Combination 7 " "	12·5	8 × 6	12 × 10	

The utmost definition is obtainable with the above.

CINEMATOGRAPH LENSES.

We have constructed specially small Lenses on the same formula as our Collinear Lenses, Series II. and III., also Portrait Lenses, Series I., which have been used with great success for Cinematograph Cameras and Lanterns.

These small Collinears have a large flat field with perfect definition. They are not suitable for projection purposes, for which our Portrait Lenses are very efficient and pass the maximum amount of light.

PRICES FOR CINEMATOGRAPH CAMERAS.

	Full Aperture.	No.	Focus.	Price. £ s. d.
			inches.	
*Collinear Lens, Series II.	F5·4	0	1¼	3 12 0
" " " II.	F5·4	1	3½	4 16 0
" " " III.	F7·7	0	2½	2 14 0
" " " III.	F7·7	00	2¾	3 14 0

* We recommend this Lens as being the most useful one.

PRICES FOR CINEMATOGRAPH LANTERNS.

	Full Aperture.	No.	Focus.	Price. £ s. d.
			inches.	
Portrait Lens, Series I. ...	F3·16	0	2¾	3 4 0
" " " "	"	1	4	4 0 0

Telephotographic Attachments, Series I.

These enable pictures to be obtained on from three to twelve times as large a scale as can be obtained with the lens they are fitted to. The magnification depends on the bellows extension available. These attachments give very sharp definition and brilliant images, as the negative lens is a threefold cemented one.

PRICES.

Telephoto Attachment suitable for	5 to 6 ins.	focus Lens	£4	0	0
,, ,, ,,	7 to 8 ins.	,,	4	15	0
,, ,, ,,	10 ins.	,,	5	10	0
,, ,, ,,	12 ins.	,,	6	10	0
,, ,, ,,	15 ins.	,,	8	0	0
,, ,, ,,	17 ins.	,,	10	0	0

Telephotographic Lenses, Series II.

Extra rapid, for Instantaneous Work and Portraiture. Full particulars on application.

Wide Angle Landscape Lenses.

Angle of View, 80°. See Complete Catalogue.

Extra Rapid Lenses, for Astronomical Photography. Full Aperture F1·8.

Extreme Rapidity, with very sharp definition and a flat field.

Collinear Lenses, Series III. Full Aperture F7·7.

See Complete Catalogue.

VOIGTLÄNDER & SOHN are the inventors of Binocular Field and Opera Glasses which they first made in 1811.

A Field Glass or small Telescope is a most useful addition to a Photographic outfit, specially when travelling. We recommend the following instruments, all of which are made with the same care and precision as our Photographic Lenses.

Field Glasses, Series J. Bodies covered best Morocco, all metal parts bronzed dull black. Achromatic Eye-pieces and Object Glasses.

Field Glasses, Series K. The same as above but mounted in Aluminium.

Porro Binocular Field Glasses. Two sizes, six and eight times magnification.

Binocular Telescopes. With two magnifications.

Terrestrial Telescopes. Specially useful when Telephoto Lenses are used, Double or Triple Object Glasses. The latter should be selected if the best possible correction for the secondary spectrum is required.

Our Photographic Lenses, Field Glasses, Telescopes, etc., can be obtained through all Dealers and Opticians.

Voigtländer & Sohn, Brunswick and London.

— SEASON 1898. —

THE WHOLESALE —
— PHOTOGRAPHIC DEPOT.



Jonathan Fallowfield,

146 Charing Cross Road,
LONDON, W.

SPECIAL LINES in all Departments of—

Cameras.	Portable Studios.
Lenses. Stands.	Dark Rooms.
Shutters.	Measures.
Mounts.	Washing Tanks.
Dry Plates.	Racks. Dishes.
Chemicals.	Printing Papers.
Hand Cameras.	Backgrounds.
Backgrounds.	Hand Cameras.
Printing Papers.	Chemicals.
Dishes. Racks.	Dry Plates.
Washing Tanks.	Mounts.
Measures.	Shutters.
Dark Rooms.	Stands. Lenses.
Portable Studios.	Cameras.

EXPORT ORDERS command Promptest Attention.

FALLOWFIELD'S

PHOTOGRAPHIC ANNUAL

— For 1898, —

Ready Early in January,

Is replete in all particulars and thoroughly revised.

Up-to-Date.

It is the standard work of its kind, and is found in every country in the world.

IT CAN BE COPIED BUT NEVER EQUALLED.

SENT POST FREE ANYWHERE FOR EIGHTEENPENCE.

1/6 1/6 1/6 1/6

NOVELTY LISTS continually issued. Send post-card for my latest, and you will be certain to find

'Something you want.'

FALLOWFIELD'S FIELD CAMERAS AND SETS

Are the most complete on the market.

Fallowfield's



'Primus' Camera.

Fallowfield's



'Perceptus' Camera.

Cameras that sell at sight. Specially prepared for Export, with well-seasoned woods.

Fallowfield's



'Peritus' Camera.

Fallowfield's



Complete Set.

SEE FULL CAMERA LIST AND 'ANNUAL.'

[*See following pages.*

IMPORTANT NOTICE

TO PHOTOGRAPHERS, PHOTOGRAPHIC DEALERS, AND EXPORT MERCHANTS.

I AM offering to above exceptionally favourable Terms for all Goods supplied, and on receipt of Trade Card will forward detailed rebate Lists of Discounts.

Clients from abroad are earnestly requested when sending indents to say of 'Jonathan Fallowfield.' Kindly at same time notify me to which Agent same has been sent, when I will at once look after your valued favours, and you may assure yourself of receiving Goods of reliable quality that has earned for me the enviable reputation that I have gained in every quarter of the Globe.

Special forwarding facilities are gained by obtaining Dry Plates from me of any maker, as I make it a study to send out only Plates absolutely new, and the rapid turn-over of my stock places me in a position of absolute security to carry out this resolution, a great desideratum to those at a distance.

In all departments my constant endeavour is to maintain perfect articles at the best prices, and in carefully watching the markets of the world am in a position to guarantee that all merchandise sent from Central Photographic Stores is

UP TO DATE.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

THE HAND CAMERA STOCK HOUSE.

All introductions on the market as soon as issued. Clients from abroad can always rely on receiving reliable Instruments, as all undergo examination before despatch, to ascertain accurate working.

As the First in the Government is the Premier,
So with Hand Cameras the First is

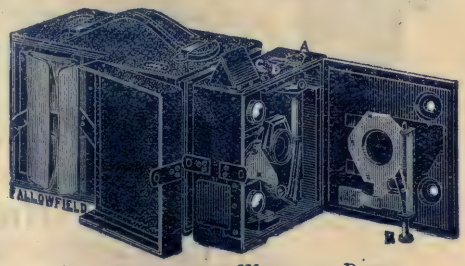
FALLOWFIELD'S 'PREMIER' HAND CAMERA.

Price, covered in finest Black Morocco, with one Changing Box, Leather Sling Case, Lock and Key, and Carriers:—

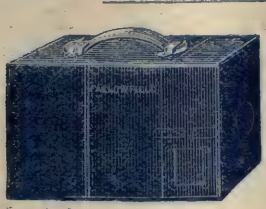
¼-Plate, **£11 11s.** ready; 5×4, **£14 14s.** ready; ½-Plate, **£18 18s.** to order.

Extra Changing Boxes, **£2 5s.** ready; **£2 15s.** ready; **£3 15s.** to order.

The 'PREMIER.'



DESIGN SHOWING WORKING PARTS.



The 'PREMIER' Hand Camera has been especially designed so that all adjustments can be made from the top of the apparatus and all the scales are in view while in use. It is compact, light, but strongly made, and thoroughly well finished in every detail. It is unobtrusive in appearance but contains every movement necessary for Hand Camera Work, and is equally suitable for use on a Tripod.

The 'PREMIER' carries 12 Plates or 24 Films, and each Changing Box carries a similar number. It measures 10×5½×5¼ and weighs only 4½ lbs.

The LENS is Wray's well-known R. R. Hand Camera Lens of 5½ in. focus, fitted with Stops F 8, 11, 16, and 22 which are worked by the milled head and indicator from outside, and both combinations are easily taken out for cleaning.

Also Ready in Stock, ¼-plate fitted with Zeiss' Anastigmatic Lens, complete, £15.

ANY MAKER'S LENSES FITTED TO SAME TO ORDER.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

'Facile' Hand Cameras still maintain = = = = = their Universal Reputation.

FALLOWFIELD'S
'FACILE' HAND CAMERA.

(1898 PATTERN.)



Carries 12 Plates or Films ($4\frac{1}{4} \times 3\frac{1}{4}$) without Changing.

PRICES COMPLETE.

With Rapid Landscape Lens of wonderful definition, and Sunk Fitted Finder, giving Identical View	5 in. focus.	3 13 6
With 5×4 Rapid Rectilinear Lens, four Rotating Stops, working at f/8, f/11, f/16 & f/22, and Fitted Finder	5½ in. focus.	5 5 0
Ditto, ditto, Covered Morocco Leather ...		6 6 0
Brown Waterproof Wraps for same ...		0 7 6
Rigid Mail-cloth Case		0 15 0
Solid Leather Case with Shoulder Strap ...		1 5 0

FALLOWFIELD'S
Focussing 'Facile' Hand Camera.

(1898 PATTERN.)

For 12 Plates or 24 Films, which require neither sheaths nor backing, and can be exposed in any rotation, so that different rapidities can be carried.



Price complete,

£7 7 0

If fitted with 'N. & G.' Regulator, giving exact exposures of $\frac{1}{100}$ to 1 second, and Indicator Dial,

£8 8 0

Cases to hold above at prices as original 'Facile,' see top of this page.

Measures 11×8×5½, and weighs under 3¾ lbs.

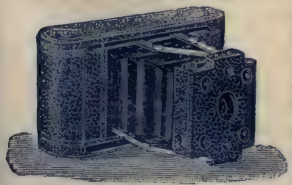
SPECIAL FEATURES.—Completely tested Lens of R. R. Facile Series, Shutter fitted with Spring Release, Automatic Lens, and Finder Cap.

For Fullest Particulars see Special Hand Camera Pamphlet recently Revised.

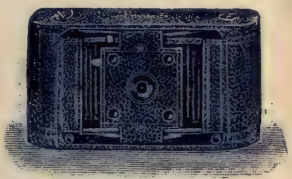
JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

Pocket Cameras for 1898.

NEW FOLDING POCKET KODAK.



Goes into any pocket.
Flat like a book.
1 inch thick.
Opens with a touch.
Closes with a nod.
Makes pictures
$3\frac{1}{4} \times 2\frac{1}{4}$ inches.
Film Cartridge for
12 exposures.
Box of 4 Spools. 7/-



PRICE £2 2s. **LOADED IN DAYLIGHT.**

— *Special Agent for* —

THE POCKET KODAK.

A Complete Kodak on a small scale.

Takes a Picture $2 \times 1\frac{1}{2}$ inches in size.



Size. $2\frac{1}{4} \times 2\frac{7}{8} \times 3\frac{7}{8}$ inches.

Weighs only $5\frac{1}{2}$ ounces.

Both films and glass plates can be used with it, and when films are used it takes a roll of 12 EXPOSURES, and can be LOADED AND UNLOADED IN DAYLIGHT, thus making a darkroom unnecessary.

PRICES.

Pocket Kodak, loaded for 12 exposures, $2 \times 1\frac{1}{2}$, **21/-**.
Box of film, 4 spools, 12 exposures each, **4/6**.
Single Spools, 12 exposures each, **1/3**.
Plate Holders, **1/-** each.

Mounts to paste on, 100—**1/3** and **1/6**
,, to slip in, 100—**2/-**
Tripod for same, **7/-**.
Plates, per Packet of 12, **1/-**.
Travelling Leather Case, **3/-** each.

The 'POCKET-CAMERA' ALBUM.

An Album for the products of pocket-camera work **2/6**

Prints can be put in and exchanged at will.

Should be in the possession of every POCKET-CAMERA Worker.



Special Terms for Quantities.

CAPACITY 176 Prints

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

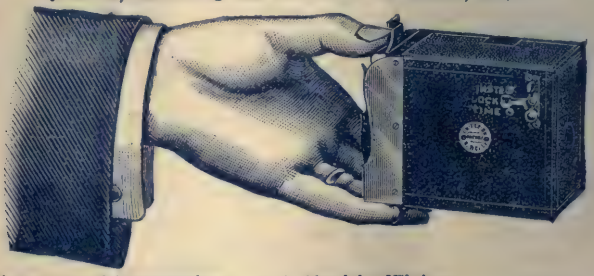
Pocket Cameras for 1898.

THE 'CRITERION' PATENT POCKET CAMERA.

FOR PLATES OR FILMS. (SIZE OF PLATE, 2½ × 1½ in.).

Solid Leather Case to hold Camera and Six Slides, 6/-. Extra Dark Slides, 1/6.

PRICE, Including SIX Double Dark Slides, 21/-.



Two Finders of special construction.
Ground Glass Screen showing picture full size.
Time and Instantaneous Shutter.
Lens works at f/10 and gives excellent definition.

Aluminium Fittings.
Size of Camera, including one slide 3¾ × 3 × 2¼ in.
Weight of Camera, 4 ozs.
Slides weigh only 1 oz., can be carried in waistcoat pocket.



PLATE-CUTTING GUIDE.

(REGISTERED.)

This cuts the Plates to fit above Camera from ¼-Plate.

For use with Diamond or Cutting Wheel, enabling Photographer to cut his own plates from plates by any maker.

¼-Plate, 1/3. Cutting Wheel, 1/-.

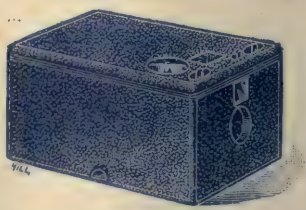
The No. o. 'Cyclist' Hawkmoth Camera.

DIMENSIONS,

6½ × 4½ × 3½

SIZE of PICTURE,

3½ × 2⅝ inches
(9cm × 6cm)



WEIGHT
(loaded with Film Cartridge for 12 Exposures)
18 ounces.

PRICES.

The No. o. 'CYCLIST' HAWKMOTH CAMERA, loaded with one Cartridge	25/-
Extra Cartridges ... ... each	1/4
Black Leather Sling Cases ... ... ,,	4/0

For Prices of developing and printing from the Films, Special Printing List.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

NOVELTIES for 1898.

New introduction of

RAYFILTERGRAPHS.



THE BAUSCH AND LOMB RAY FILTER.

THE Bausch and Lomb Ray Filter, shown above, is especially adapted for cloud effects and for rendering true colour values in all kinds of photography.

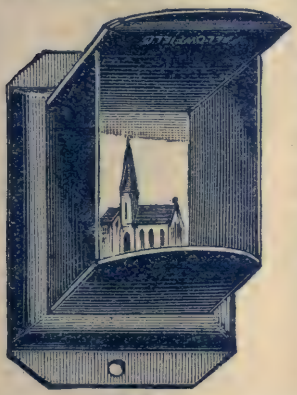
The Filter consists of two thin pieces of optical glass, the surfaces of which have been ground and polished perfectly plane and parallel. Between these plates is cemented a glass ring, of uniform thickness throughout, forming a cell to hold the requisite solution of bichromate of potash. The glass part is mounted in a neat metal ring, which protects it, and holds the filter firmly in proper position upon the front of the lens. It will be found that this filter is of the utmost practical value in every kind of out-door work, except for the most rapid exposures.

Marine views, snow scenes and mountain photographs are beautifully rendered as the Ray Filter eliminates the white haze, thus giving perfectly distinct pictures of distant peaks which are often invisible to the eye.

This Filter is also invaluable for photographing and printing coloured interiors, as well as for making plates for the three-colour process, with three binding screws for attachment to the lens hood. With each filler is provided an additional supply of the bichromate solution, which has been duly tested with the spectroscope, also filler and pliers complete.

No. 1, $1\frac{3}{8}$ in. 14/- ea.	No. 3, $2\frac{3}{16}$ in. 15/- ea.	No. 5, $2\frac{5}{8}$ in. 19/- ea.	No. 7, $3\frac{1}{4}$ in. 23/- ea.
,, 2, $1\frac{1}{4}$,, 15/- ,,	,, 4, $2\frac{9}{16}$,, 17/- ,,	,, 6, $3\frac{3}{8}$,, 21/- ,,	,, 8, $4\frac{1}{8}$,, 25/- ,,

FALLOWFIELD'S NEW FINDER SHADE.



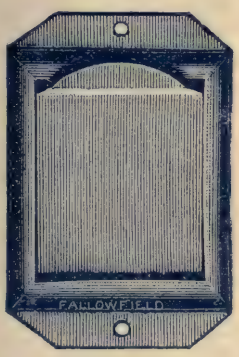
OPEN.

A real boon to those who have Cameras with uncovered Finders.

Is automatically opened, and all sides shaded from light by one movement.

—:o:—

PRICE,
1/6 EACH.



CLOSED.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

Fallowfield's Cameras and Complete Sets.



Field Cameras

FALLOWFIELD'S

ORIGINAL

'Primus'

Camera.

COMPLETE SETS.

	4¼ × 3¼	5 × 4	6½ × 4¾	7½ × 5	8½ × 6½	10 × 8	12 × 10	15 × 12
	£4 10 0	£4 19 0	£5 14 0	£6 4 0	£7 1 0	£8 10 0	£10 2 0	£13 4 0
	2 2 0	2 6 6	2 16 0	3 9 0	3 9 0	4 0 0	5 0 0	6 13 6
	0 18 6	0 18 6	0 18 6	0 18 6	1 1 0	1 1 0	1 5 0	1 12 6
	1 0 6	1 0 6	1 3 6	1 3	1 7 6	1 12 6	12 6	1 17 6
	0 12 0	0 12 0	0 17 6	1 0 0	1 4 0	1 6 6	1 10 0	1 15 6
	0 4 6	0 4 6	0 4 6	0 5 0	0 5 6	0 5 6	0 5 6	
	£9 7 6	10 1 0	11 14 0	13 0 0	14 8 0	16 15 6	19 15 0	25 3 0

Plates. Inches.	With 1 Double Dark Slide, and 2 Inner Frames, in 1 slide only.	Extra Double Slides. each.	Brass Binding. extra.	Inner Frames.
4¼ × 3¼	... £3 4 0	... £0 13 0	... £0 15 0	... £0 1 3
5 × 4	.. 3 12 0	... 0 13 6	... 0 17 6	... 0 1 3
6½ × 4¾	... 4 4 0	... 0 15 0	... 1 0 0	... 0 1 6
7½ × 5	... 4 8 0	... 0 18 0	... 1 5 0	... 0 1 9
8 × 5	... 4 10 0	... 0 18 6	... 1 10 0	... 0 1 9
8½ × 6½	... 5 1 0	... 1 0 0	... 1 10 0	.. 0 1 9
10 × 8	. 6 2 0	... 1 4 0	... 1 12 0	.. 0 2 0
12 × 10	... 7 2 0	... 1 10 0	... 1 15 0	... 0 3 6
15 × 12	.. 9 4 0	... 2 0 0	... 2 0 0	... 0 4 6
18 × 16	. 12 10 0	... 3 0 0	... 2 10 0	... 0 5 6
20 × 16	... 14 0 0	... 3 6 0	... 2 12 6	... 0 6 9
22 × 18	... 15 10 0	... 3 12 0	... 2 15 0	... 0 8 6
24 × 20	... 17 10 0	... 3 16 0	... 3 0 0	... 0 10 0

CONTENTS.

PRIMUS CAMERA and 3 DOUBLE SLIDES.
FALLOFWIELD'S RAPID DOUBLET LENS with Iris Diaphragms.
FALLOWFIELD'S TRIPOD STAND. 3-fold Best
THORNTON-PICKARD'S Time and Instantaneous SHUTTER.
CANVAS CASE, FOR CAMERA, RIGID CASE, SLIDES LENS, &c.
FLEXIBLE CASE, FOR TRIPOD STAND.

SPEED INDICATOR extra to cost of Shutter, 3/6, if ordered at same time.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

CAMERAS AND SETS.

CAMERA ONLY.

FALLOWFIELD'S 'PERITUS' CAMERAS.

COMPLETE SETS.

— CONTENTS. —	6½×4¾	7½×5	8¼×6½	10×8	12×10	15×12
No. 1 or No. 2 PERITUS CAMERA, and 3 Double Slides.	£6 10 0	£7 0 0	£8 0 0	£9 13 0	£11 8 0	£13 15 0
FALLOWFIELD'S RAPID DOUBLET LENS, with IRIS DIAPHRAGMS.	2 16 0	3 9 0	3 9 0	4 0 0	5 0 0	6 13 6
FALLOWFIELD'S Best THREE FOLD Tripod Stand.	0 18 6	0 18 6	1 1 0	1 1 0	1 5 0	1 12 6
THORNTON-PICKARD'S TIME and INSTANTANEOUS Shutter.	1 3 6	1 3 6	1 7 6	1 12 6	1 12 6	1 17 6
RIGID CANVAS CASE, for Camera, Slides, &c.	0 17 6	1 0 0	1 4 0	1 6 6	1 10 0	1 15 6
FLEXIBLE CASE, for Tripod Stand.	0 4 6	0 5 0	0 5 6	0 5 6	0 5 6	
	£12 10 0	13 16 3	15 7 0	17 18 6	21 1 0	25 14 0

Price, including 1 Double Slide and 2 Carriers.

Inches.		Extra Slides.	Brass Binding.
6½ × 4¾	£5 5 0	£0 15 0	£1 0 0
8½ × 6½	6 10 0	1 0 0	1 10 0
10 × 8	7 15 0	1 4 0	1 12 0
12 × 10	9 5 0	1 10 0	1 15 0
15 × 12	11 10 0	2 0 0	2 0 0
18 × 16	14 10 0	3 0 0	2 10 0
20 × 16	15 15 0	3 6 0	2 12 6
22 × 18	18 5 0	3 12 0	2 15 0
24 × 20	19 0 0	3 16 0	3 0 0

For Foreign Sizes and Prices, see Annual.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

Cameras & Sets.

FALLOWFIELD'S 'PERCEPTUS' CAMERAS.

COMPLETE.

COMPLETE SETS.

— CONTENTS. —

	6½×4¾	7½×5	8½×6½	10×8	12×10	15×12
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Perceptus Camera and 3 **Double Slides**	7 16 0	8 6 0	9 13 0	11 8 0	13 2 0	16 16 0
Fallowfield's Rapid Doublet **Lens**, with Iris Diaphragms	2 16 0	3 9 0	3 9 0	4 0 0	5 0 0	6 13 6
Fallowfield's Best Three-fold Tripod Stand ...	0 18 6	0 18 6	1 1 0	1 1 0	1 5 0	1 12 6
Thornton-Pickard's Time and Instantaneous **Shutter**	1 3 6	1 3 6	1 7 6	1 12 6	1 12 6	1 17 6
Rigid Canvas Case, for Camera, Slides, &c. ...	0 17 6	1 0 0	1 4 0	1 6 6	1 10 6	1 15 6
Flexible Case, for Tripod Stand	0 4 6	0 5 0	0 5 6	0 5 6	0 5 6	
£	13 16 0	15 2 0	17 0 0	19 13 6	22 15 0	28 15 0

Prices, with 1 Double Back, inner Frames, and Focussing Screen.

For Plates. Inches.	Horizontal and Vertical. £ s. d.	Square. £ s. d.
6½×4¾ ...	6 0 0	6 6 0
7½×4½ ...	6 0 0	6 6 0
7½×5 ...	6 5 0	6 10 0
8½×6½ ...	7 0 0	7 13 0
10×8 ...	8 10 0	9 0 0
12×10 ...	9 15 0	10 2 0

For Plates. Inches.	Horizontal and Vertical. £ s. d.	Square. £ s. d.
15×12 ...	12 0 0	12 16 0
18×16 ...	—	16 10 0
20×16 ...	—	17 15 0
22×18 ...	—	18 5 0
24×20 ...	—	21 0 0

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

FALLOWFIELD'S (*Top value yet offered.*)

NEW CHEAP SERVICEABLE COLONIAL OUTFIT.

Consisting of . .
CAMERA.
SLIDE.
R.R. IRIS LENS.

THORNTON-PICKARD PATENT SHUTTER.

ASH TRIPOD.

—:o:—

The Baseboard of Camera is cut out to allow it to close without detaching Lens or Shutter.

Double dark slide has automatic lock catches, flexible joints, ivory numbers and side clips.

Lens is guaranteed achromatic and as fine a quality as can be desired.

The T. P. Shutter is adjustable from $\frac{1}{15}$ to $\frac{1}{250}$ sec.

Polished Ash Tripod, has no loose parts and is quickly set up.



COMPLETE SETS:
Half-plate, **£4 4s.**
Whole-plate, **£6 6s.**

EXTRA SLIDES:
10/- and **14/6**

FALLOWFIELD'S NEW 'WEST END' SET.

FOR PLATES, $4\frac{1}{4} \times 3\frac{1}{4}$, **£4.** $6\frac{1}{2} \times 4\frac{3}{4}$, **£5.** $8\frac{1}{2} \times 6\frac{1}{2}$, **£7.**

Consisting of Conical Bellows, Camera, Reversible Back, Swing Back, 2 Double Dark Slides (Book Form), Rapid Rectilinear Lens, with Iris Diaphragms, Folding Tripod Stand, Focussing Cloth, 1 dozen Plates, Developing Solution, Trays for Developing and Fixing, Dark Room Lamp, Developing Cups and Graduated Measure; fitted in Strong Box Complete.

$4\frac{1}{4} \times 3\frac{1}{4}$, **£4** $6\frac{1}{2} \times 4\frac{3}{4}$, **£5.** $8\frac{1}{2} \times 6\frac{1}{2}$, **£7**

No dealer in the kingdom should be without this article, as it is far away and pounds above the value of any set yet placed on the market *at the price.*

Special Terms to dealers by taking three at a time.

NOTE.—All Sets yet introduced at this price have had square front Cameras, solid slides, and single landscape lens, so extra value of above will at once be patent to intending purchasers.

JONATHAN FALLOWFIELD, 146 Charing Cross Rd., W.

CAMERAS.

FALLOWFIELD'S

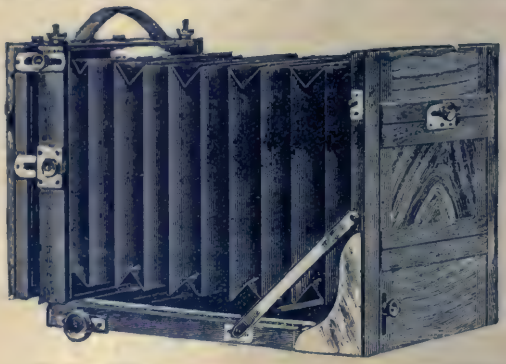
New Pattern Cheap Square Rigid Front Camera

—:o:—

This is an extremely useful Camera, and its low price should cause for it a large demand.

Fitted with rack and pinion, swing back, long extension, and 1 book form slide.

—:o:—



		Extra Slides.				Extra Slides.
½ plate	£4 7 6	each 12/-	10 × 8	£7 2 6	each	21/6
1/1 ,,	£5 10 0	,, 16/6	12 × 10	£8 12 6	,,	26/6

FALLOWFIELD'S

New Pattern Cheap Taper Bellows Camera,

WITH EXTENDING FRONT.



This is an extremely useful Camera, and well adapted for the Tourist or Professional Photographer, for outdoor work,

Is fitted with good bellows, swing back, rack and pinion, and extending front clamped by endless rods, for use with short focus lens.

PRICES—Camera and 1 double book form Slide.

		Extra Double Slides.				Extra Double Slides.
6½ × 4¾	£2 17 6	each 12/-	10 × 8	£5 2 6	each	21/6
8½ × 6½	£3 17 6	,, 16/6	12 × 10	£6 15 0	,,	26/6

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

IMPORTANT REDUCTION IN PRICE OF

— Fallowfield's Improved —

Portrait, Rapid Doublet, & Wide Angle Lenses.

(GUARANTEED ENGLISH MANUFACTURE.)

FALLOWFIELD'S UNRIVALLED PORTRAIT LENSES.—Guaranteed of English Manufacture. Challenge :: comparison with the finest and highest priced made.

	Diameter.	Focus.	Distance.	Price.
No. 1, for Carte-de-Visite	2 in. ...	4½ in. ...	12 ft. ...	£2 10 0
„ 1A, „ „ „	2¼ „ ...	4½ „ ...	14 „ ...	2 14 0
„ 2, „ Cartes and Cabinet ...	2¾ „ ...	6 „ ...	18 „ ...	5 0 0
„ 3, „ Cabinets	3¼ „ ...	9 „ ...	18 „ ...	7 5 0
„ 4, „ „ and 8½×6½ ...	4 „ ...	12 „ ...	25 „ ...	12 5 0
„ 4A, „ „ „ „ ...	3½ „ ...	12 „ ...	25 „ ...	9 10 0

FALLOWFIELD'S IMPROVED RAPID DOUBLETS.



Diam.	View Size.	Group Size.	Waterhouse Diaphragms. Price.	Iris Diaphragms. Price.
¼ in....	4½×3½ ...	Stereo ...	£1 16 0 ...	£2 2 0
1 „ ...	5 ×4 ...	4½×3½ ...	2 0 0 ...	2 6 6
1½ „ ...	7½×4½ ...	5 ×4 ...	2 10 0 ...	2 16 0
1½ „ ...	8½×6½ ...	8 ×5 ...	3 0 0 ...	3 9 0
1½ „ ...	10 ×8 ...	8½×6½ ...	3 7 6 ...	4 0 0
2 „ ...	12 ×10 ...	10 ×8 ...	4 5 0 ...	4 15 0
2¼ „ ...	13 ×11 ...	11 ×9 ...	4 10 0 ...	5 0 0
2½ „ ...	15 ×12 ...	13 ×11 ...	6 0 0 ...	6 13 6
3 „ ...	18 ×16 ...	15 ×12 ...	6 15 0 ...	7 8 0

FALLOWFIELD'S WIDE ANGLE DOUBLETS.

With Rotating Diaphragms.

For Architectural Views, Interiors, Copying, &c., giving an angle of 90 degrees.

Diam.	View Size.	Back Focus	Equiv. Focus.	Price.
¾ in. ...	Stereo ...	2¼ in. ...	3 in. ...	£1 18 0
¾ „ ...	7½×4½ ...	3½ „ ...	4 „ ...	2 0 0
1½ „ ...	8½×6½ ...	4½ „ ...	5½ „ ...	2 10 0
1½ „ ...	10 ×8 ...	6½ „ ...	7 „ ...	3 3 0
1½ „ ...	12 ×10 ...	7½ „ ...	8½ „ ...	3 12 0
2 „ ...	15 ×12 ...	10 „ ...	11½ „ ...	4 0 0



All above Subject to 10 %, Discount for CASH WITH ORDER ONLY.

Seven days' trial allowed with all above, and Cash returned if not approved of.

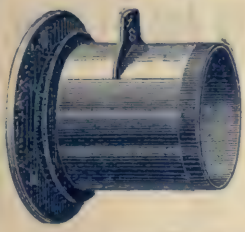
These Lenses are used extensively in every part of the world. We have seen most gratifying results.

JONATHAN FALLOWFIELD, 146 Charing Cross Rd., W.

Any Lens on this page subject to a Discount of 5 per Cent. for CASH WITH ORDER.

FALLOWFIELD'S Special Cheap Series of
C.C.R. RAPID RECTILINEAR LENSES

(GUARANTEED ACHROMATIC).





Working F/8 with Moveable Hoods.



To Cover Plates.	With Waterhouse Diaphragms.	With Iris Diaphragms.
5× 4 in.	14/6 each.	18/6 each.
7× 5 ,,	18/6 ,,	22/6 ,,
9× 7 ,,	29/- ,,	32/6 ,,
10× 8 ,,	52/6 ,,	60/- ,,
12×10 ,,	80/- ,,	90/- ,,

Each Lens fitted with Solid Leather Covered Cap, and equal in value to many offered at much higher prices.

FALLOWFIELD'S SPECIAL WIDE ANGLE
RECTILINEAR LENSES.



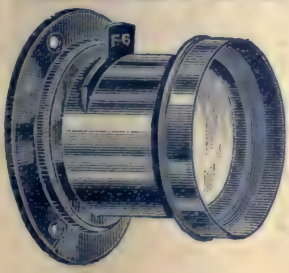
With ROTATING STOPS or IRIS DIAPHRAGMS.

For Architectural Views, Landscapes and Views in confined situations where Lenses of longer focus cannot be used.



To Cover Plates.	Back Focus.	Rotating Stops.	Iris Diaphragms.
5× 4 in.	3 5/16 in.	30/- each.	— each.
7× 5 ,,	5 ,,	37/6 ,,	43/6 ,,
9× 7 ,,	6½ ,,	65/- ,,	72/- ,,
10× 8 ,,	8 ,,	80/- ,,	90/- ,,
12×10 ,,	10¼ ,,	100/- ,,	110/- ,,

FALLOWFIELD'S EXTRA SPECIAL EURYSCOPE LENSES.



WORKING APERTURE, F/6.

Specially adapted for Groups, Portrait or Instantaneous Work, being very rapid and giving good flat field.

To Cover Plates.	Back Focus.	Iris Diaphragms.
4½×3½ in.	5 in.	52/- each.
7 ×5 ,,	7¾ ,,	80/- ,,
9 ×7 ,,	10 ,,	110/- ,,
10 ×8 ,,	12½ ,,	190/- ,,

Very exceptional Terms to Dealers in Quantities.

STAMP & MINETTE PORTRAITS

A TAKING NOVELTY EVERYWHERE.

Now kept in Stock in Four Sizes.



SOLE ENGLISH AGENT FOR THE SALE OF

— THE NEW —

Postage Stamp Cameras.

As simple as A.B.C.
Camera always set in focus.

Price, Camera and Slide, with 4 Lenses for 4 on 5×4 Picture 2½×1½, **£5**; with 8 Lenses for 8 on a 3×5 Picture 1×½, **£8 18s.**; with 16 Lenses taking 16 on a 5×4, **£5 10s.**; with 25 Lenses taking 25 on a 7×5, **£10 10s.**

Perforator, for Perforating as Stamps, £7 5s. extra.

This includes right of using same. If this is not purchased you cannot produce pictures.

SPECIMEN PICTURES ON APPLICATION.



EXTRA BORDERS, 1/- EACH.

ILFORD PLATES, kept in stock, 7×5 ins., **3/5** doz.

P.O.P. PAPER FOR PRINTING ON SAME—

2 sheets, **1/4** | 6 sheets, **4/-** | ¼-quire, **7/6**

PRINTING FRAMES, **1/6** each.

DEVELOPING DISHES, XYLONITE, **10d.** each.

A practical test of these Cameras has been made since their arrival here, and they give every satisfaction. Lenses cannot get out of focus, as they are cemented in solid block. It is a decided novelty, and should sell rapidly wherever introduced.

JONATHAN FALLOWFIELD 146 Charing Cross Road, W.

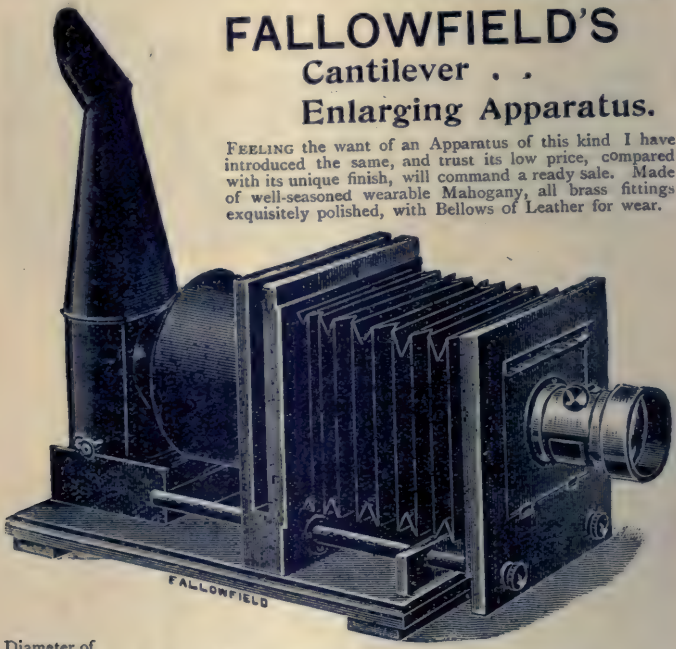
SPECIAL — NEW.

FALLOWFIELD'S

Cantilever . .

Enlarging Apparatus.

FEELING the want of an Apparatus of this kind I have introduced the same, and trust its low price, compared with its unique finish, will command a ready sale. Made of well-seasoned wearable Mahogany, all brass fittings exquisitely polished, with Bellows of Leather for wear.



Diameter of Condenser,	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.
Cover Plates,	3¼×3¼	4¼×3¼	5×4	6½×4¼	7½×5	8½×5½
			12×9 c/m.			
	65/- ...	7?/- ...	84/- ...	116/- ...	165/- ...	270/- Without Lens.
	27/- ...	87/- ...	63/- ...	63/- ...	63/- ...	63/- Extra for Lens.

Special Notice.—LANCASTER GOODS.

A Full Stock kept of LANCASTER'S CAMERAS, &c., subject to Discount of 5 per cent. Cash with Order. FAVOURABLE TERMS TO DEALERS.

All Articles sold by the following Firms mostly in Stock at Makers' Prices :—

THORNTON-PICKARD CO.—Shutters, Stands, and Cameras.

TYLAR, Birmingham.—General London Stock Depot for this Maker.

LENSES BY ALL MAKERS. Most all in Stock in general demand.

EASTMAN CO.—Kodaks, Kodets, Bromide Papers, Lenses.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

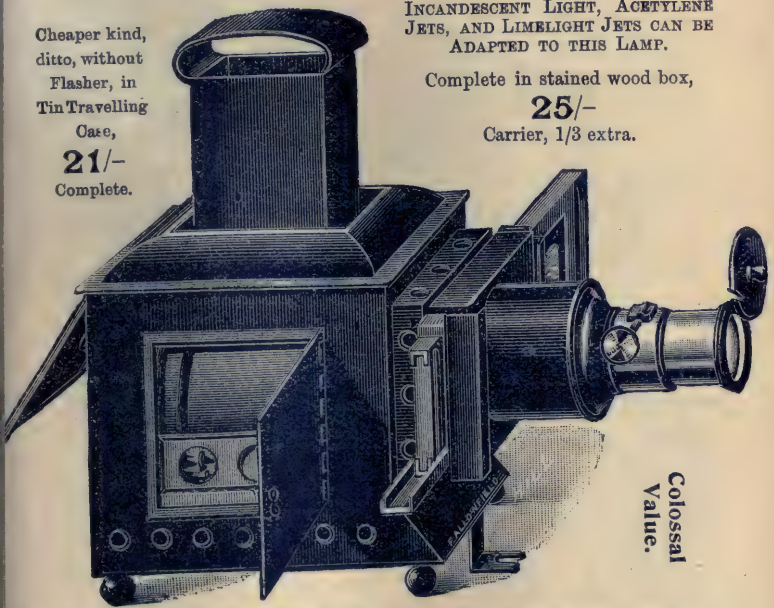
21/- **MAGIC LANTERNS.** 25/- etc.

FALLOWFIELD'S SPECIAL PATTERN

Cheaper kind, ditto, without Flasher, in Tin Travelling Case,
21/-
Complete.

INCANDESCENT LIGHT, ACETYLENE JETS, AND LIMELIGHT JETS CAN BE ADAPTED TO THIS LAMP.

Complete in stained wood box,
25/-
Carrier, 1/3 extra.



Colossal Value.

THIS is a handsome, strongly built japanned Lantern, well ventilated, fitted with 4-in. compound condenser mounted in brass cell, first-class projection Lens with flasher and rack adjustment, 3-wick refulgent lamp, sliding front, Russian iron chimney, spring carrier slide. All packed away compact in stained case, with hooks to close, and brass handle for carrying.

Complete ... ... **25/-** Carriers extra ... ... **1/3** to **10/6**

Ditto, ditto, extra finish Mahogany Body, 4-wick lamp **52/6**

THE IMPERIAL,

Ditto, ditto, with solid Brass Stage Front, heavy square bevelled Base Board and Panelled Door **80/-**

All complete in Cases.

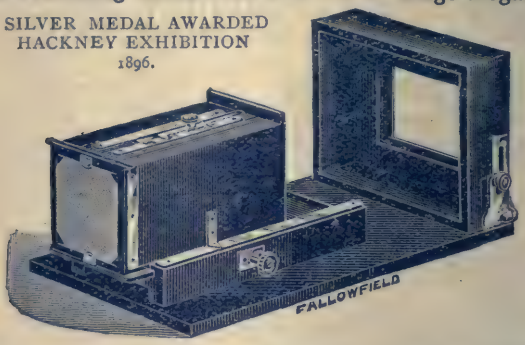
Incandescent Burners ... ... **5/6** each.
Mantles for same ... ... **1/3** „
Complete Installation Tray, Burner, Mantle, &c. **18/6**
Tubing for same ... ... **4½d.** per foot run.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

NEW LANTERN SLIDE MAKING CAMERA

For Producing Slides from Parts of or Large Negatives.

SILVER MEDAL AWARDED
HACKNEY EXHIBITION
1896.



THIS Camera has been invented and patented by Dr. Roland Smith, and he describes his invention as follows. He has practically used it for the production of Microscopic Slides for the Lantern, a test that should demonstrate its value to intending purchasers.

. . POINTS. . .

FIRST.—In dealing with larger negatives, the whole or any part can be reduced to Lantern size.

SECOND.—In dealing with smaller negatives, the whole or any part can be Enarged to Lantern Size.

THIRD.—Provision made or Tilting Negative when the lines are out of vertical.

FOURTH.—Practical Automatic Focussing, this being done by pointer and scale on base-board.

FIFTH.—Compactness. Considering its capacity or work, the size is not more than one-half of that of other Reducing Cameras.

SIXTH.—Reasonable Price.

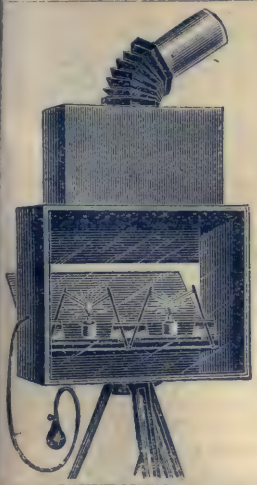
COMPLETE DESCRIPTION.

THE Camera complete is fixed on a base-board 18×10. At one end is a fixed frame 8¼×6¼ inches, with moveable masks for half- and quarter-plate, at right angles to the optic axis of lens, with a mechanical stage attached, so that it can carry any portion of the negative on the square, or tilted into the optic axis of the lens, and fix it there for photographing.

The Camera is Sliding Box Form, the outer case carrying the dark slide and focussing screen, the inner one of the lens, each made to move into the optic axis of the lens for focussing purposes, quite independent of the other—the outer by rack and pinion, the inner by thumb screw and clamp. A Marked Scale, with a pointer on the one side, shows the distance of the camera for enlarging, and on the other side the distance for reductions; similar markings on top show position of lens. Exposure is made by simply removing a vulcanite shutter from front of lens. In using this camera, the source of light may be either artificial or daylight; if the latter, the whole camera can be sloped against a window covered with tissue paper, the time of exposure by that means being reduced to about 30 seconds.

Price, fitted with Single Lens of 3 in. focus of good definition, **£3 10s.**
Ditto, fitted with Selected Wide-angle Rectilinear Lens, **£4 5s.**

JONATHAN FALLOWFIELD 146 Charing Cross Road, W.



SALMON'S

New Portable Pneumatic

Magnesium Lamp

FOR PORTRAITURE.

(PATENT APPLIED FOR.)

A powerful Actinic Light of several seconds duration, producing a Photograph.

EQUAL TO DAYLIGHT. NO DANGER.

No Heat. No Noise. Constructed with light Telescopic Chimney, which can be inclined to any available outlet.

For Studio or Room. Shuts up in box form when not in use. Light, compact, and portable.

Fuller Particulars on application.

Price, complete ... ... £10 10s.

TRIPOD FOR SAME, £1 5s. extra.

SALMON'S NEW PATENT

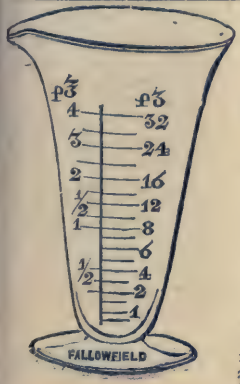
ADJUSTABLE VIGNETTER

For Portraiture and Landscapes.

A great saving of time to Professionals. Can be immediately attached or detatched to any Printing Frame, firmly clipped by Aluminium Slides. Adjustable in every direction. Vignetting Card can be placed at various distances from Negative, and at an angle, or immediately changed.

PRICES.—Including Slides and 12 Cards (six with openings of various sizes, and six for cutting as desired), ¼-plate, **2/-**; ½-plate, **2/6**; ¼-plate, **3/6**. With Superior Printing Frame and Slides attached: ¼-plate, **2/6**; ½-plate, **3/3**; ¼-plate, **4/9**. *Special Terms to Dealers.*





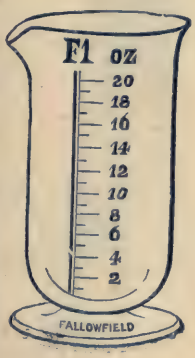
IMPORTANT REDUCTION in price of

Graduated Glass Measures.

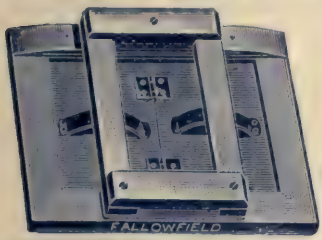
CONICAL OR CYLINDRICAL GRADUATED.

Both same price.

	Each.	Doz.
1 dr.	5d. ...	4/-
2 ,, ...	5d. ...	4/-
1 oz.	4d. ...	3/6
2 ,, ...	4d. ...	3/6
4 ,, ...	6d. ...	5/6
6 ,, ...	7d. ...	6/6
8 ,, ...	8d. ...	7/6
10 ,, ...	9d. ...	8/6
20 ,, ...	1/- ...	11/6



FALLOWFIELD'S
NOVEL PRINTING PRESSES.



This patttern is decidedly novel, but extremely useful, the double springs and clamping bars giving equal pressure, and consequently good even prints. It will be sold as

THE DOUBLE BAR PRINTING PRESS.

In two sizes only, ¼ and ½-plate.
Well finished in good hard white wood and baize pad.
¼-plate, **8d.** ... ½-plate, **1/-** each.



This is exceedingly useful, and well finished, and will be sold as

FALLOWFIELD'S FULL VIEW PRINTING PRESS.

Enabling the Printer to see the whole of his picture without the fear of movement.
Sold in three sizes. Well finished, with clamping bar and bed.
¼-pl. **1/3**; ½-pl. **1/6**; ¼-pl. **3/-** ea.



FALLOWFIELD'S NEW VAPOR LIGHT DARK ROOM LAMP.

No fear of accident. Cannot set light if upset.

Contains no liquid except that contained in absorbent material.

Price, complete with Ruby Chimney and Cowl, **2/3**
Extra Chimneys, 6d. each.

The Mode of Using is as follows:—Unscrew burner, and fill with benzoline; after a few seconds to allow sponge in reservoir to absorb, pour back into stock bottle all you can, then put back burner and light wick.

THE CLEANEST, CHEAPEST, AND BEST LAMP ON THE MARKET.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

THE THREE STANDARD LINES BELOW

Are handled by all Dealers in every part of the World.

SPECIAL ADVANTAGEOUS TERMS FOR QUANTITIES ON APPLICATION.

Special New Formula.

Stock Dealers see to your Supplies.

Always ready for use.
Always fresh.
Pleasant to manipulate.





1s. BOTTLE.
Equal to any on the Market.

COMBINED TONING & FIXING BATH.

½-pints, 1/3. —
— Pints, 2/3.

CONCENTRATED ONE SOLUTION HYDROQUINONE DEVELOPER.

Sample Bottles, 6d.
5 oz., to make 1 Pint,
— 1/3 —
10 oz., to make 2 Pints, 2/-
Postages extra.

Special New Formula.

Have an Article that Sells at Sight.

Economical in practice.
Makes Mounting a pleasure instead of a bore.



IF ANY DIFFICULTY IN OBTAINING PLEASE SEND DIRECT.

JONATHAN FALLOWFIELD, 146 CHARING CROSS ROAD, W.

* DRY PLATES. *

BEING the Largest Wholesale Stock Holder of DRY PLATES of all makes, my turnover being so large enables me to assure my Clients DRY PLATES supplied are always the Freshest. Deliveries from all Works daily.

I am supplying the following at the Popular Prices of

ILFORD	Ordinary	$4\frac{1}{2} \times 3\frac{1}{4}$, 1/-
,,	Empress	5 × 4, 1/7
,,	Red Label	$6\frac{3}{4} \times 3\frac{1}{4}$, 2/-
,,	Isochromatic	$6\frac{1}{2} \times 4\frac{1}{2}$, 2/2
,,	Process	$6\frac{1}{2} \times 4\frac{3}{4}$, 2/3
,,	Half Tone	$7\frac{1}{4} \times 4\frac{1}{2}$, 2/10
,,	Special Lantern	$7\frac{1}{2} \times 5$, 3/5
,,	Alpha	8 × 5, 3/9
For Lantern Slides and Transparencies.		$8\frac{1}{2} \times 6\frac{1}{2}$, 4/3
CADETT	Ordinary	9 × 7, 5/-
,,	Special Rapid	10 × 8, 7/3
,,	Professional	12 × 10, 10/6
IMPERIAL	Ordinary	15 × 12, 18/-
,,	Sovereign	
,,	Lantern	
,,	Landscape	
,,	Tropical	
,,	and Photo-Mechanical ...	
EDWARDS'	Excelsior	Per Packet of
PAGET	Phenix	12 Plates.
,,	30 times	
,,	Portrait	
MAWSON	Castle	10 × 8
,,	Electric	12 × 10
ELLIOTT	Ordinary	and 15 × 12
,,	Studio	in Packets
THOMAS'S	Plates	of 6 Plates at
SANDELL	Ordinary	3d.
ALL SAME PRICES.		box extra.
Other Makers at Current Rates.		

Special Discounts to Professional Photographers and Dealers on ALL MAKES of Dry Plates. Quotations on application or receipt of Business Card.

☞ FOR LARGER SIZES SEE

FALLOWFIELD'S MAMMOTH ANNUAL.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

DRY PLATES

Other than those set out on last page. All in stock.

EDWARDS' XL.—Isochromatic Medium, Instantaneous, and Snap-Shot.

4½×3½	... ...	doz.	1/6	7½×5	... ...	doz.	4/6	10× 8	... ...	doz.	10/-
5 ×4	... ...	,,	2/6	8½×6½	... ...	,,	6/6	12×10	... ...	,,	16/-
6½×4½	... ...	,,	3/8	9 ×7	... ...	,,	8/-	15×12	... ...	,,	24/-

Edwards' Excelsior at Popular Prices.

CADETT LIGHTNING, Red Label Plates.

4½×3½	... ...	doz.	1/6	7½×5	... ...	doz.	4/6	10× 8	... ...	doz.	10/-
5 ×4	... ...	,,	2/6	8½×6½	... ...	,,	6/6	12×10	... ...	,,	16/-
6½×4½	... ...	,,	3/8	9 ×7	... ...	,,	8/-	15×12	... ...	,,	24/-

IMPERIAL FLASH LIGHT. MAWSON'S CELERITAS. PAGET XXXXX TIMES.

Same Prices as EDWARDS' *and* CADETT'S *above.*

LUMIERE DRY PLATES.—Ordinary and Orthochromatic Plates.

	Ordinary and Orthochromatic. Extra Rapid.		Ordinary and Orthochromatic. Series A & B.		Panchromatic. Series C.
4½ × 3½	... ... doz.	1/6	... ... doz.	1/8	... ... doz. 1/10
5 × 4	... ... ,,	2/3	... ... ,,	2/6	... ... ,, 2/9
6½ × 4¾	... ... ,,	3/4	... ... ,,	3/9	... ... ,, 4/2
7½ × 5	... ... ,,	4/6	... ... ,,	5/2	... ... ,, 5/10
8½ × 6½	... ... ,,	6/6	... ... ,,	7/6	... ... ,, 8/6
10 × 8	... ... ,,	10/-	... ... ,,	11/-	... ... ,, 12/-
12 ×10	... ... ,,	15/-	... ... ,,	16/6	... ... ,, 18/-

WRATTEN & WAINWRIGHT'S 'LONDON.' Revised Prices.

	Ordinary and Instantaneous.		Drop-Shutter Special	
4½ × 3½	... ... doz.	1/6	... ... doz.	1/9
5 × 4	... ... ,,	2/3	... ... ,,	2/9
6¾ × 3½	... ... ,,	3/-	... ... ,,	3/6
6½ × 4½	... ... ,,	3/-	... ... ,,	3/6
6½ × 4¾	... ... ,,	3/3	... ... ,,	4/-
7½ × 4½	... ... ,,	3/9	... ... ,,	4/6
7½ × 5	... ... ,,	4/6	... ... ,,	5/3
8 × 5	... ... ,,	5/-	... ... ,,	5/9
8½ × 6½	... ... ,,	6/-	... ... ,,	7/6
10 × 8	... ... ,,	9/-	... ... ,,	10/9
12 ×10	... ... ,,	14/3	... ... ,,	17/6
15 ×12	... ... ,,	27/-	... ... ,,	32/-

RE-INTRODUCTION OF THE

HILL NORRIS COLLODION DRY PLATES. (London Agency—146 CHARING CROSS ROAD.)

Brand—	4½×3½	6½×4½	8½×6½	10×8	12×10
EAGLE, Yellow Label	1/6	3/-	7/-	10/-	19/- doz.
,, TORTOISE, Green Label	1/6	3/-	7/-	10/-	19/- ,,
,, CAMERA, Positive Plate, Scroll Label	1/6	3/-	7/-	10/-	19/- ,,

EDWARDS' CATHODAL PLATES.

4½×3½	¼-plate.	8½×6½	10×8	12×10
1/6	3/8	6/6	10/-	18/- dozen.

SANDELL WORKS CO. RONTGEN PLATES.

4½×3½	¼-plate	8½×6½	10×8	12×10	15×12
1/-	1/7	4/3	7/3	10/6 ...	18/- dozen.

SPECIAL DRY PLATES for the RONTGEN X RAYS RADIOGRAPHS.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

FILMS.

FRESHEST FILMS (stock continuously new) at the Popular Prices of—

ILFORD Empress ... ...
" Special Rapid ... ...
$4\frac{1}{4} \times 3\frac{1}{4}$ ... ... **2/-** | $8\frac{1}{2} \times 6\frac{1}{2}$ ... ... **8/-** } dozen.
$6\frac{1}{2} \times 4\frac{1}{4}$ ... ... **4/6** | 10 × 8 ... ... **12/-** }

ELLIOTT Rocket ... ...

EDWARDS' (XL) Special Landscape ... ...
" " " Instantaneous ...
" " " Portrait ... ...

$4\frac{1}{4} \times 3\frac{1}{4}$	**1/6**
5×4	**2/6**
$6\frac{1}{2} \times 4\frac{3}{4}$	**3/8**
$7\frac{1}{2} \times 5$	**4/6**
$8\frac{1}{2} \times 6\frac{1}{2}$	**6 6**
10 × 8	**10/-**

☞ NOTE.

EDWARDS' (XL) Isochromatic, Medium, Instantaneous, and Snap-Shot.

$4\frac{1}{4} \times 3\frac{1}{4}$ ... ... **2/-** | $8\frac{1}{2} \times 6\frac{1}{2}$ ... ... **6/6** } dozen.
$6\frac{1}{2} \times 4\frac{3}{4}$ ... ... **3/8** | 10 × 8 ... .. **10/-** }

Per Packet of 12 Films.

AUSTIN-EDWARDS' Ordinary Films—

☞ NOTE.

AUSTIN-EDWARDS' Instantaneous Films.

$4\frac{1}{4} \times 3\frac{1}{4}$ ... **1/9** | $6\frac{1}{2} \times 4\frac{3}{4}$ ... **4/1** | $8\frac{1}{2} \times 6\frac{1}{2}$ ... **7/3** doz.

AUSTIN-EDWARDS' Double Instantaneous Films.

$4\frac{1}{4} \times 3\frac{1}{4}$ ... **2/-** | $6\frac{1}{2} \times 4\frac{3}{4}$ ... **4/6** | $8\frac{1}{2} \times 6\frac{1}{2}$ ... **8/-** doz.

POCKET KODAK.

Spools of 12 exposures ... ... **1/3** | 4 in a box **4/6**
FOLDING POCKET KODAK Spool of 12, **1/9**; 4 in a box, **7/-**

FILMS FOR FRENA.

FRENA CELLULOID FILMS.	Per Packet of 20. No. 1. Lantern Plate.	No. 2. ¼-plate.
Setoloid	1/10	...
Austin-Edwards' Ordinary	2/6	... 3/7
Austin-Edwards' Instantaneous	2/3	... 3/11
Austin-Edwards' Double Instantaneous	2/6	... 4/3
B. J. Edwards & Co.'s Isochromatic, Instantaneous, and Snap-Shot	3/-	... 4 6
Thomas'	2/6	... 3/9
Fitch	2/8	... 4/3
Imperial Co.'s Snap-Shot	2/9	... 4/3
Marion & Co.'s Ordinary	2/8	... 3/11
Marion & Co.'s Instantaneous	3/2	... 4/6
Ilford Special Rapid	2/8	... 3/9
Ilford Empress	2/4	... 4/3

BULLSEYE AND BULLET SPOOLS.

SPOOLS OF FILM for No. 2 Bullseye and Bullet Kodaks—
12 Exposures... ... ... **2/6** | 18 Exposures **3/9**
SPOOLS OF FILM for No. 4 Bullseye and Bullet Kodaks—
12 Exposures **3/9**

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

PHOTOGRAPHIC PRINTING PAPERS.

A FULL AND FRESH STOCK ALWAYS ON HAND.
ALL EXPORT ORDERS SPECIALLY PACKED.

All the following Makes in Stock at one uniform price in all Sizes.

P.O P. { ILFORD (Britannia Works Co.) SOLIO (Eastman).
SYLVIO (Wellington & Ward). PAGET PRIZE.
IMPERIAL. BARNET (Elliot). GELATOID (Schering.)

PACKETS OF

4½ × 3½,	36	Pieces,	1/-	with postage,	1/2	7½ × 5,	12	Pieces, 1/-	with postage, 1/2
5 × 4,	24	,,	1/-	,, ,,	1/2	8½ × 6½,	9	,, 1/-	,, ,, 1/3
6 × 4½,	24	,,	1/-	,, ,,	1/2	10 × 8,	12	,, 2/-	,, ,, 2/3
6½ × 4½,	16	,,	1/-	,, ,,	1/2	12 × 10,	12	,, 3/-	,, ,, 3/3

TUBES OF

24½ × 17	2	Sheets,	1/1	with postage,	1/7	24½ × 17	12	Sheets, 7/6	with postage, 7/11
	6	,,	4/-	,, ,,	4/3		24	,, 15/-	,, ,, 15/8

BOXES OF

3⅛ × 2⅜,	144	Pieces,	1/10	with postage,	2/1	5½ × 4,	144	Pieces, 4/8	with postage, 4/11
3½ × 2½,	144	,,	1/8	,, ,,	1/11	8 × 6,	144	,, 12/-	,, ,, 12/5
5¾ × 44,	144	,,	5/-	,, ,,	5/3				

FALLOWFIELD'S
'PREMIER' SENSITIZED PAPER.

AS GOOD AS ANY. BETTER THAN MOST.

Send for a Sample and try the improved method of production now employed.

First in the market, and still leading. Demand unprecedented, demonstrate its superior and uniform quality. Silver bath not kept weak for small saving. Every sheet guaranteed to give equal results.

PRICES AS FOLLOW:

			Sheet.	¼-Quire.	½-Quire.	Quire.
No. 1.	9 Kilo.	White, Pink, or Mauve ...	-/8	3/6	6/6	12,6
No. 3.	10 ,,	White or Pink	-/9	3/9	7/4	14/3

Post Free. Cash with Order.

READY CUT FOR MOUNTING.
C.-de-V.'s or CABINETS.

1	Sheet	-/9	¼-plate	2/9	per	100
¼	Quire	3/9	½ ,, ...	6/6	,,	100
½	,, ...	7/4	7½ × 5	7/3	,,	100
1	,, ...	14 3	Whole Plate	10/6	,,	100
100	C.-de-V.	1/9	10× 8	7/9	,,	50
100	Cabinet	4/2	12 × 10	13/6	,,	50
			15 × 12	20/-	,,	50

The quickest Printing Paper and richest in Silver on the Market.

METAL PLATES FOR SQUEEGEEING.

P.O.P. and other Papers to obtain High Gloss or Matt Surface.

I am now enabled to place on the market an Enamelled Metal Plate that cannot by any means peel off—you cannot scratch it off. This will at one appeal to you as a great advance, and far beyond anything yet placed on the market. It will be sold in the following sizes:—

7×5 ... -/8 | 9×7 ... 1/- | 11×9 ... 1/6 | 13×11 ... 2/3 | 16×14 ... 3/6

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

FALLOWFIELD FOR MOUNTS.

SPECIAL NEW LINE IN

VIEW MOUNTS.

A Good Mount Enhances the Value of your Work.

The most Important Advance in Quality of Mounts, at Exceptionally Low Figures, for many years.

AS the market has now been flooded some time with cheap, common- quality, soft Mounting Boards, I have at last succeeded, after considerable experiments, in perfecting a good, hard, smooth-surface Mount, that I am enabled to place on the market at a price that will compete with the inferior kinds offered. It will well repay all Photographers to send for a sample fifty, and their appearance will at once demonstrate their superiority over all other kinds offered at the following prices. Only the following sizes stocked, and in five varieties. My other well-known high-class Superfine Mounts as usual.

— SIZES AND PRICES. —

Size of Board.	Size of Tint or Line.	No. of Mount.	Indian Tint. 100.	Indian Tint. 1000.
4½ × 3	3 × 1¾	P217 ...	1/2	11/-
7 × 5¼	4½ × 3½	P219 ...	1/8	16/-
8 × 6	5¼ × 3¾	P220 ...	2/-	19/6
8½ × 6½	6 × 4¼	P222 ...	2/6	23/-
10 × 8	7 × 5	P224 ...	3/3	31/-
12 × 10	9 × 7	P226 ...	4/9	45/-
14 × 11½	10 × 8	P227 ...	6/9	65/6
18 × 14	12 × 10	P229 ...	12/-	113/-
20 × 16	14 × 11	P230 ...	16/6	157/6

Size of Board.	Size of Tint or Line.	No. of Mount.	Plate-sunk with Tint. 100.	Plate-sunk with Tint. 1000.
4½ × 3	3 × 1⅞	P817 .	1/8	15/-
7 × 5¼	4½ × 5½	P819 ...	2/3	20/-
8 × 6	5¼ × 3¾	P820 ...	2/6	24/-
8½ × 6½	6 × 4¼	P822 ...	2/10	27/-
10 × 8	7 × 5	P824 ...	3/9	35/-
12 × 10	9 × 7	P826 ...	5/6	52/-
14 × 11½	10 × 8	P827 ...	8/-	75/-
18 × 14	12 × 10	P829 ...	13/6	128/-
20 × 16	14 × 11	P830 ...	18/-	175/-

Size of Board.	Size of Tint or Line.	No. of Mount.	Granulated with Paste-down Tint. 100.	Granulated with Paste-down Tint. 1000.
4½ × 3	3 × 1¾	P1317 ...	2/6	23/-
7 × 5¼	4½ × 3½	P1319 ...	3/-	28/6
8 × 6	5¼ × 3¾	P1320 ...	3/6	33/-
8½ × 6½	6 × 4¼	P1322 ...	4/-	38/6
10 × 8	7 × 5	P1324 ...	5/3	51/-
12 × 10	9 × 7	P1326 ...	7/9	73/-
14 × 11½	10 × 8	P1327 ...	10/9	103/-
18 × 14	12 × 10	P1329 ...	16/6	155/-
20 × 16	14 × 11	P1330 ...	22/6	215/-

Size of Board.	Size of Tint or Line.	No. of Mount.	Oxford Line. 100.	Oxford Line. 1000.
4½ × 3	3 × 1¾	P317 ...	1/2	11/-
7 × 5¼	4½ × 3½	P319 ...	1/8	16/-
8 × 6	5¼ × 3¾	P320 ...	2/-	19/6
8½ × 6½	6 × 4¼	P322 ...	2/6	23/-
10 × 8	7 × 5	P324 ...	3/3	34/-
12 × 10	9 × 7	P326 ...	4/9	45/-
14 × 11½	10 × 8	P327 ...	6/9	65/6
18 × 14	12 × 10	P329 ...	12/-	113/-
20 × 16	14 × 11	P330 ...	16/6	157/6

Size of Board.	Size of Tint or Line.	No of Mount.	Plate-mark Paste-down Tint. 100.	Plate-mark Paste-down Tint. 1000.
4½ × 3	3 × 1¾	P917 ...	2/3	21/-
7 × 5¼	4½ × 3½	P919 ...	2/9	26/-
8 × 6	5¼ × 3¾	P920 ...	3/3	30/-
8½ × 6½	6 × 4¼	P922 ..	3/9	35/-
10 × 8	7 × 5	P924 ...	5/-	47/-
12 × 10	9 × 7	P926 ...	7/-	68/-
14 × 11½	10 × 8	P927 ...	10/-	96/-
18 × 14	12 × 10	P929 ...	15/6	145/-
20 × 16	14 × 11	P930 ..	21/-	195/-

The above gives a Complete List of Stock.

EXTRA SIZE IN OXFORD LINE MOUNT READY IN STOCK.

	Board.	Line.	100.	1000.
P318 ...	6½ × 4¼ ...	4¼ × 3 ...	1/6	14/-

Full Lists of General Photo Goods on hand sent free on application.

JONATHAN FALLOWFIELD, 146 CHARING CROSS ROAD, W.

Fallowfield's . .

MOUNTS

IN GREAT VARIETY.

IMPORTANT NOTICE re PRICES.

CARTE-DE-VISITE.

Bristol, 4 sheet, plain	5/6 1000
Enamel, 4 „ „	7/- „
Bristol, 6 „ gold bevel ...	19/- „
Enamel, 6 „ „ light colours	20/6 „
Enamel, 6 sheet, gold bevel, dark colours	23/- „

Special Terms for Wholesale Quantities.

CABINET.

	1000
5 sheet Bristol	19/-
Second quality	14/6
5 sheet Enamel...	23/-
Second quality	20/6
6 sheet Bristol, gold bevel	39/-
6 „ Enamel, „	43/-
Second quality	
Light colours, Bristol	33/6
„ „ Enamelled	40/6
Dark „ „	43/-

Blocked Mounts in Gold, Silver, and Colours.

Full Prices in New Mount List.

PLAIN, SQUARE, and ROUND CORNERED BOARDS IN ALL SIZES.

From 2½×3½ to 15×12.

MIDGET MOUNTS.

ALL GOLD BEVEL EDGES.

	100	1000
C.-D.-V. Midget, Bristol ... Victoria „ „ ...	1/8	14/9
Cabinet „ „ ...	1/10	16/3
Promenade „ „ ...	1/9	15/9
Boudoir „ „ ...	1/10	16/6
C.-D.-V. „ Enamel ... Victoria „ „ ...	1/8	15/0
Cabinet „ „ ...	1/10	16/9
Promenade „ „ ...	2/-	17/3
Boudoir „ „ ...	2/2	19/-
Midget C.-D.-V., Plain Edge	-/8	4/-
„ Victoria „ „		5/3
„ Cabinet „ „	-/9	5/9
„ Promenade „ „	-/9	5/9

In Cream, Pink, or Grey Bristol.

POCKET KODAK MOUNTS OR CRITERION.

	doz.	100	1000
Slip-in ...	-/4	2/-	20/-
Paste on, White Enamel ...		1/6	12/6
Grey Bristol		1/3	11/-

BULLET & BULL'S-EYE MOUNTS AND FRENA.

Frena Slip-in... ... ... 3/- per 100.
Bullet or Bull's-eye... ... 3/- „

Outside size, 5½×5; Opening, 3¼×3½.

See next page for Printing Prices, &c.

PROFESSIONAL PHOTOGRAPHERS

Are specially advised to look at following Prices.

SPECIAL DISCOUNTS FOR CASH WITH ORDER.

PRINTED, BLOCKED or STAMPED MOUNTS.

Compare Prices and 'BUY FOR CASH.'

MY PRICE FOR SPECIAL QUALITY LINES.

		£	s.	d.		
5000	C.-de-V. Mounts, Bristol ... printed one side	2	2	6	... 5	sheet.
5000	,, ,, ,, ... ,, both sides	2	12	6	... 5	,,
2500	Cabinet ,, ,, ... ,, one side	2	12	0	... 5	,,
2500	,, ,, ,, ... ,, both sides	3	6	0	... 5	,,
5000	C.-de-V. ,, Light Enamelled ,, one side	2	12	6	... 5	,,
5000	,, ,, ,, ,, both sides	3	2	6	... 5	,,
2500	Cabinet ,, ,, ,, one side	3	6	0	... 5	,,
2500	,, ,, ,, ,, both sides	3	13	9	... 5	,,
5000	C.-de-V. ,, Dark Enamelled ,, one side	3	7	6	... 5	,,
5000	,, ,, ,, ,, both sides	3	17	6	... 5	,,
2500	Cabinet ,, ,, ,, one side	3	17	6	... 5	,,
2500	,, ,, ,, ,, both sides	4	5	0	... 5	,,
5000	C.-de-V. Mounts, Bristol, Gold Bevel Edge, Blocked in Gold on front...	7	7	6	... 6	,,
5000	C.-de-V. Mounts, Light Enamelled, ditto ...	8	0	0	... 6	,,
5000	,, ,, Dark Enamelled, ditto	8	5	0	... 6	,,
2500	Cabinnet Mounts, Bristol, Gold Bevel Edge, ditto	6	5	0	... 6	,,
2500	,, ,, Light Enamelled, dito	7	7	6	... 6	,,
2500	,, ,, Dark Enamelled, ditto	7	8	9	... 6	,,
5000	C.-de-V. Mounts, Bristol, Plain Bevel Edge, Blind Blocked on front	3	12	6	... 6	,,
5000	C.-de-V. Mounts, Light Enamelled, ditto	4	7	6	... 6	,,
5000	,, ,, Dark Enamelled, ditto	4	10	0	... 6	,,
2500	Cabinet Mounts, Bristol, Plain Bevel Edg e ...	3	3	9	... 6	,,
2500	,, ,, Light Enamelled	4	2	6	... 6	,,
2500	,, ,, Dark Enamelled	4	7	6	... 6	,,

All above Prices Include cost of Cards. Fuller particulars in Annual and Mount List.

QUALITY UNEXCEPTIONAL. ALL ROUNDED CORNERS.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

FALLOWFIELD'S SPECIAL SERIES OF

Xmas and New Year Mottoes.

PRICES AND SIZES OF MOUNTS AND CARDS.

ASK FOR FULL DESCRIPTIVE LIST. ALL IN STOCK.

FLORA.

	doz.	100.
Midget ...	1/9	12/6
C.D.V. ...	1/9	12/6
½ plate ...	2/0	15/0
Cabinet ...	3/6	25/0

SYLVIA.

	doz.	100.
Midget ...	1/2	8/0
C.D.V. ...	1/2	8/0
½ plate ...	1/4	10/0
Cabinet ...	2/0	15/0

GARDENIA.

	doz.	100.
Midget ...	1/4	10/0
C.D.V. ...	1/4	10/0
½ plate ...	1/9	12/6
Cabinet ...	2/6	17/6

SAFFIANA.

	doz.	100
Midget ...	1/9	12/6
C.D.V. ...	1/9	12/6
½ plate ...	2/0	15/
Cabinet ...	2/9	20/(

BROMIDA.

	doz.	100
Pocket Kodak	0/10	6 0
Bullet ...	1/3	8/6
C.D.V. ...	1/3	8/6
½ plate ...	1/4	10/0
Cabinet ...	1/9	12/6

VISTA.

	doz.	100.
Pocket Kodak Criterion	0/9	5/6
Bullet ...	1/2	8/6

ARTISTA.

	doz.	100.
Pocket Kodak	0/8	4/6
Midget ...	0/8	4/6
C.D.V. ...	1/10	6/0
Cabinet ...	1/4	9/6
½ plate ...	1/0	7/6

PALETTE.

Pocket Kodak,
Single with Stand. *Double.*

doz.	100.	doz.	100.
2/6	18/0	3/0	22/0

Promenade Midget.

2/9	20/0
3/3	25/0

CANVAS.

	doz.	100.
Pocket Kodak	1/0	7/0
Bullet ...	1/3	9/6
C.D.V. ...	1/2	8/3
½ plate ...	1/4	10/0
Cabinet ...	1/9	13/6

TABELLA.

	doz.	100.
C.D.V. ...	1/2	8/3
½ plate ...	1/3	9/6
Cabinet ...	1/9	13/6

PICCOLO.

	doz.	100.
Stamp Portrait size only.	0/5	2/9

MIKADO.

Enamel. Bristol

Promenade	100.	100
Midget...	2/9	2/(
C.D.V. ...	3/0	2/(
½ plate ...	3/0	3/(
Cabinet ...	4/9	4/(

MARGARET.

	doz.	100.
Midget ...	1/6	11/6
C.D.V. ...	1/6	11/6
½ plate ...	1/10	14/0
Cabinet ...	3/0	22/0

GEMMA.

	doz.	100.
Midget ...	1/2	8/6
C.D.V. ...	1/2	8/6
½ plate ...	1/5	10/0
Cabinet ...	2/0	15/0

ROSETTE.

	doz.	100.
Midget ...	1/4	10/0
C.D.V. ...	1/4	10/0
½ plate ...	1/8	12/0
Cabinet ...	2/9	20/0

SERICA.

	doz.	100.
Midget ...	1/9	12/6
C.D.V. ...	1/9	12/6
½ plate ...	2/0	15/(
Cabinet ...	2/9	20/0

FAVORITA.

	doz.	100.
Midget ...	1/9	12/6
C.D.V. ...	1/9	12/6
½-plate ...	2/0	15/0
Cabinet ...	2/9	20/0

PUNCH.

	doz.	100.
Pocket Kodak only.	1/3	9/0

MEDICI.*

	doz.	100.
C.D.V. ...	1/4	10/0
½ plate ...	1/7	14/0
Cabinet ...	2/3	16/6

STUART.*

	100.
Midget	4/(
C.D.V.	5/0
½ plate	6/6
Cabinet	10/0

* Please say if for Portrait or Landscape-way in these two instances.

JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

FALLOWFIELD'S

XMAS & NEW YEAR FANCY MOUNTS.

ORDINARY C.-D.-V. & CABINET XMAS MOUNTS.

IN NEW STYLE.

Plain White Bevels. Mottoes Stamped in Pure White.

A VERY CHASTE AND EXCEPTIONALLY BEAUTIFUL EXAMPLE OF HIGH-CLASS MOUNTS.

Sold in four sizes only—C.-D.-V., ¼-plate, Cabinet, and ½-plate.

Colours of Mounts—Pale Sea Green, Dark Green, Æsthetic Brown.

C.-D.-V.—Portrait way only...	6d. per doz.	... 3/- per 100.	... 24/- per 1000.
Cabinet—Portrait and Landscape...	10d. ,,	... 5/- ,,	... 45/- ,,
¼-plate —Landscape	8d. ,,	... 3/6 ,,	... 33/- ,,
½-plate —Landscape	1/- ,,	... 6/- ,,	... 55/6 ,,

Postage extra. Designs are assorted in 8 kinds—Xmas, New Year, Best Wishes, &c.

FALLOWFIELD'S New Neat Chaste Design

XMAS, NEW YEAR, AND BIRTHDAY MOUNTS.

Blocked in Real Gold at foot of Mounts. Landscape or Portrait way.

C.-D.-V. 9d. doz. ... 4/- 100	Cabinet, 1/- doz. ... 7/- 100	7½×5 ... 1 9 doz. ... 13/- 100
4½×3½ ... 10d. ,, ... 5/3 ,,	6½×4¾ 1/3 ,, ... 8/- ,,	8½×6½ ... 2/- ,, ... 15/- ,,
5×4 ... 1/- ,, ... 6/- ,,	Boudoir, 1/6 ,, ... 11/6 ,,	Imperial, 2/3 ,, ... 17/- ,,

FALLOWFIELD'S UNRIVALLED SETS OF

CHRISTMAS & NEW YEAR PHOTO CARDS.

Parcel No. 1.—7/-

CONTAINS

3 Midget 'Flora'
3 C.-D.-V. ,,
3 ¼-plate ,,
3 Cabinet ,,
3 C.-D.-V. 'Bromida'
3 Cabinet ,,
3 C.-D.-V. 'Canvas'
3 ¼-plate ,,
5 Cabinet ,,
3 C.-D.-V. 'Margaret.'
3 ¼-plate ,,
3 Cabinet ,,
3 C.-D.-V. 'Gemma'
3 ¼-plate ,,
3 Cabinet ,,

Post Free, 7/-

45 assorted Mounts.

Parcel No. 2.—5/-

CONTAINS

3 C.-D.-V. 'Sylvia'
3 Cabinet ,,
3 C.-D.-V. 'Saffiana'
3 Cabinet ,,
3 C.-D.-V. 'Artista'
3 Cabinet ,,
3 C.-D.-V. 'Tabella'
3 Cabinet ,,
3 C.-D.-V. 'Rosette'
3 Cabinet ,,
3 C.-D.-V. 'Serica'
3 Cabinet ,,

Post Free, 5/-

36 assorted Mounts.

Parcel No. 3—3/9

CONTAINS

3 Midget 'Flora'
3 ,, 'Sylvia'
3 ,, 'Gardenia'
3 ,, 'Saffiana'
3 ,, 'Artista'
3 ,, 'Mikado'
3 ,, 'Margaret'
3 ,, 'Gemma'
3 ,, 'Rosette'
3 ,, 'Serica'
2 ,, 'Favorita'
3 ,, 'Stuart'

Post Free, 3/9.

36 assorted Cards.

Parcel No. 4.—3/-

CONTAINS

3 Pocket Kodak 'Bromida'
3 ,, ,, 'Vista'
3 ,, ,, 'Artista'
3 ,, ,, 'Palette'
3 ,, ,, 'Canvas'
3 ,, ,, 'Punch'
3 Bullett 'Bromida'
3 ,, 'Canvas'
3 ,, 'Vista'

Post Free, 3/-

27 Assorted Cards.

Each set packed in strong tastefully got up box, with take-off lid.

FALLOWFIELD'S Ordinary Set of

Xmas and New Year Mounts.

Price, post free ... 2/6.

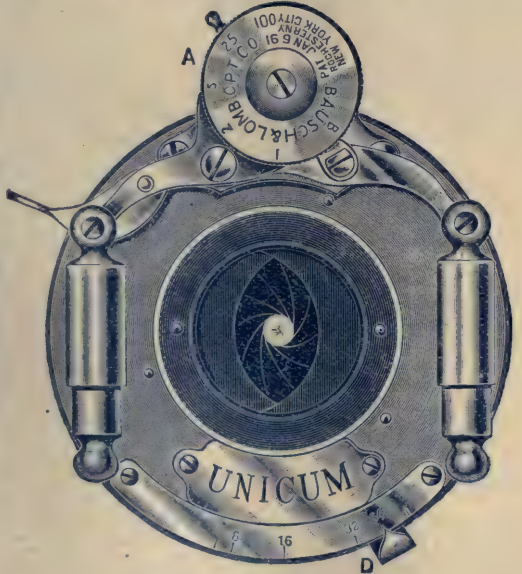
JONATHAN FALLOWFIELD, 146 Charing Cross Road, W.

SPECIAL AGENT FOR

BAUSCH & LOMB'S

NEW IRIS SHUTTER.

The Prices should compel a large demand.



At a Lower Rate than hitherto.

THE NEW IRIS SHUTTER.

THIS Shutter has pneumatic and finger release, and instantaneous exposures of various speeds can be given by turning a dial. Time exposures can be given by retaining the pressure on the ball or finger release at will; while to obtain lengthened exposures for interiors it may be set to remain open for any period.

THE FOLLOWING SIZES IN STOCK :—

5×4 Without Speed Indicator, **22/6** each.		7×5 Without Speed Indicator, **29/-** each.	
5×4 With " " **26/-** "		7×5 With " " **32/-** "	

If fitted to Zeiss or Goerz Lenses, extra for fitting. Estimates given.

REVISION OF PRICES OF

'LN' FERROTYPE DRY PLATES.

The only Sizes made and Prices will be as follows:—

2½×2, per Packet of 3 dozen ... **2/9**		4¼×6½, per Packet of 1 dozen ... **5/-**	
2½×3¼ " " 1 " ... **1/6**		7 ×5 " " 1 " ... **5/6**	
4¼×3¼ " " 1 " ... **2/6**		8½×6½ " " 1 " ... **10/-**	

VICTORIA Size, sheathed in boxes of 40, **2/3.**

POSITIVE AND FERROTYPE MATERIALS.



TRAYS. Gilt Fillet on Front.

Black or Red only in $\frac{1}{8}$ size.

		doz.	3 doz.	gross.	
$\frac{1}{16}$ size,	$2\frac{1}{2} \times 2$,	-/5½	1/3	5/-	*Black.*
$\frac{1}{8}$,,	$3\frac{1}{4} \times 2\frac{3}{4}$,	-/6½	1/7	6/3	,,
,, ,,		-/8	1/10	7/-	*Red.*
$\frac{1}{4}$,,	$4\frac{1}{4} \times 3\frac{1}{4}$,	1/-	2/-	10/6	*Black.*

GLASS.

Ninth Size,	$2\frac{1}{4} \times 2$	(Prices fluctuate.)	3 doz.	gross.
Second ,,	$3\frac{1}{4} \times 2\frac{3}{4}$ { Common		-/2½	-/10
	{ Seconds		-/4½	1/6
	{ Best Polish		-/6	2/-
Quarter ,,	$4\frac{1}{4} \times 3\frac{1}{4}$ { Common		-/7½	2/3
	{ Seconds		-/7½	2/3
			1/-	4/-



MAT & PRESERVER—

Loose or Combined, for Ferro or Glass Picture.

	Size.		doz.	3 doz.	gross.
$\frac{1}{16}$ size,	$2\frac{1}{2} \times 2$	...	-/3½	-/5	3/-
$\frac{1}{8}$,,	$3\frac{1}{4} \times 2\frac{3}{4}$	...	-/4½	1/-	4/-
$\frac{1}{4}$,,	$4\frac{1}{4} \times 3\frac{1}{4}$	...	-/8	1/10	7/-
$\frac{1}{4}$,,	Combination		-/4	1/-	3/6
$\frac{1}{4}$,,	,,		-/7	1/9	6/-

VICTORIA SIZE MATERIAL.

	Gross.
Preservers	1/4
Trays	4/6
Fancy Frames ...	5/-
Glass	-/9

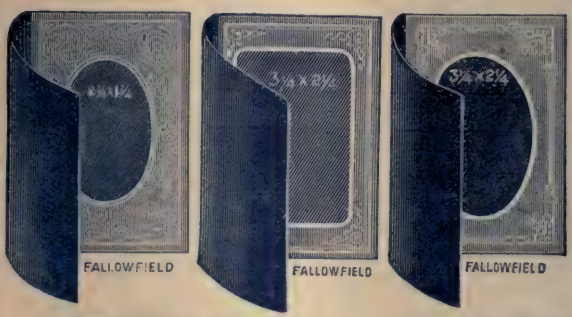
VICTORIA MOUNTS

With Gummed Backs.
7/6 1000,
Oval or Cushion.
Envelopes, 9/6 1000.

NOVELTY LISTS always on hand.

'HOW TO MAKE FERROTYPES.
— Post free, *4d.* —

FERROTYPE ENVELOPES, for $\frac{1}{6}$ and $\frac{1}{4}$ sizes.



Ferrotype Envelopes,
in Fancy Colours and Coloured Flaps, with Opening as marked above, 100, 1/3 1000, 11/-
Cabinet Size, ditto, *Oval or Dome Opening,* 100, 2/9 1000, 25/-

FERROTYPE PLATES.

Sole English Agent.

	Pair.	Doz.	100.	Box of 200
Black or Chocolate.				
Buffalo ...	-/8	2/6	18/-	35/-

All 14 × 10 inches.

CUT-UP FERROTYPE PLATES.

$2\frac{1}{2} \times 2$ ...	...in Boxes of 8 doz	1/9 ;	doz.	-/3½
$3\frac{1}{4} \times 2\frac{3}{4}$...	... ,, ,,	2/6 ;	,,	-/5
$4\frac{1}{4} \times 3\frac{1}{4}$...	... ,, ,,	-/4 ;	,,	-/8
7 × 5 ...	... ,, 4 ,,	4/9 ;	,,	1/6

E. CHERON'S FERROTYPE DRY PLATES.

100 Victorias Sheathed, 6/6 Box ; $3\frac{1}{4} \times 2\frac{3}{4}$, 1/9 doz. ; $4\frac{1}{4} \times 3\frac{1}{4}$, 3/- doz.

JONATHAN FALLOWFIELD 146 Charing Cross Road, W.

MORGAN & KIDD

ARGENTIC-GELATINO-BROMIDE WORKS,

KEW FOOT ROAD, RICHMOND, LONDON, S.W.

TELEGRAPHIC ADDRESS:—'ARGENTIC,' RICHMOND, SURREY.

Bankers:—London and County.

Post Office Orders payable at Chief Office, Richmond, Surrey.

Inventors of the Argentic-Gelatino-Bromide Process.

THE STANDARD METHOD OF PRODUCING

PERMANENT ENLARGEMENTS AND CONTACT PRINTS.

14 PRIZE MEDALS AWARDED.

MORGAN & KIDD'S

ARGENTIC-GELATINO-BROMIDE PAPER

The Standard make in use by Photographers.

MORGAN & KIDD'S

ENLARGING AND FINISHING

IN BROMIDE, CARBON, or PLATINOTYPE.

Unapproachable in Quality, and executed with a promptitude beyond rivalry.

Morgan & Kidd's CATALOGUE,

The largest and most complete List ever published of Arg.-Gel.-Bromide Papers, Opal Plates, Sensitive Canvases, &c., &c.; Dry Plates, Enlarging, Finishing, Framing, &c., &c., Collotype Printing, &c., &c., Ceramic Enamels, &c.

Post Free to Professional Photographers on Application.

See following pages.

MORGAN & KIDD.

ABRIDGED PRICE LIST.

BROMIDE PAPERS.

Ordinary Surface (Smooth or Rough), Platino-Matt, Cream Crayon and Rose or White Enamels.

PRICE PER DOZEN AND HALF-DOZEN.

Size.	*Ordinary Plat.-Matt or Cream Crayon.		Enamels, Rose or White.		Size.	*Ordinary Plat.-Matt or Cream Crayon.		Enamels, Rose or White.	
	1 doz	½ doz.	1 doz.	½ doz.		1 doz.	½ doz.	1 doz.	½ doz.
4¼ × 3¼	-/6	—	-/8	—	15¼ × 12½	6/9	3/9	7/6	3 9
6½ × 4¾	1/1	—	1/6	—	18 × 15	9.6	5/3	11/-	5/6
8 × 5	1/5	—	2/-	—	23 × 17	12/6	6/9	14/-	7/-
8¼ × 6½	1/11	—	2/6	—	25 × 21	18/3	10/-	21/-	10/6
10 × 8	2/9	—	3.6	—	30 × 23	24/6	12/6	26/6	13/6
12½ × 10½	4/6	2/9	5 6	2/9	30 × 25	26/-	14/-	28/6	14/3

* Also in ROLLS, 20 feet long; 25 ins. wide, 17/6; 30 ins. wide, 21/-; 40 ins. wide, 28/-; and 53 ins. wide, 36/6.
Enamel Bromide Paper, 20 feet long, 25 ins. wide, 20/-

ORDINARY (Natural Surface).—Is made with a Smooth or a Rough surface Smooth is sent unless Rough is specified in order.

PLATINO-MATT.—A beautiful and perfectly Matt-surfaced Paper, giving prints exactly resembling, and fully equal in quality to, Platinotype prints.

CREAM CRAYON.—A new **Cream-tinted** Rough Surface Bromide Paper, suitable for finish with Crayon or Brush. The warm tone of the Paper is exceedingly effective for Portraits, Landscapes, &c.

WHITE ENAMEL.—A White Bromide Paper, with a brilliant Enamelled surface.

ROSE ENAMEL.—A Rose-tinted Bromide Paper, with a brilliant Enamelled surface.

NOTE.—The Argentic-Gelatino-Bromide Papers are sent post free. Sample Sheet, 23 × 17, **1/6.**

THE ARGENTIC MATT SURFACE OPAL PLATES.

For Enlarging and Printing direct from Negative. The semi-transparent nature of the Opal Plate gives a beautiful softness and delicacy to the image unattainable on other bases.

Including a small sheet of Argentic Paper for trial exposure with every plate

Size of Plate.	¼ doz.	½ doz.	Size of Plate.	¼ doz.	½ doz.	Size of Plate.	¼ doz.	½ doz.
4¼ × 3¼	2/6	—	12 × 7½	11/6	6/-	16 × 13	22/-	12/-
6½ × 4¾	4/-	—	12 × 10	13/-	7/-	18 × 15	30/-	16/-
8¼ × 6½	6/10	—	15 × 12	20/-	11/-	20 × 1[illegible]	34/-	18/-
10 × 8	8/6	4/10	17 × 10½	20/-	11/-	24 × 1[illegible]	46/-	24/-

ARGENTIC-GELATINO-BROMIDE WORKS,
Kew Foot Road, RICHMOND, S.W.

ENLARGING AND FINISHING.

BROMIDE ENLARGEMENTS ON OPAL.

Size.	Price of Enlargement.	Finished in Black and White, EXTRA.			Painted in Water Colours, EXTRA.			Plush Frames, with Flat Glass and Gold Sunk bevelled matt.	Black and Gold Frames, with Flat Glass and Gold Sunk bevelled matt. Patt. 747.
		3rd class.	2nd class.	1st class.	3rd class.	2nd class.	1st class.		
$4\frac{1}{2} \times 3\frac{1}{4}$ $6\frac{1}{2} \times 4\frac{3}{4}$	2/-	2/6	5/-	10/-	5/-	10/-	20/-	—	—
$8\frac{1}{2} \times 6\frac{1}{2}$	4/-	5/-	10/-	20/-	10/-	20/-	40/-	6/-	5/6
10×8	4/6	6/-	12/-	24/-	12/-	25/-	50/-	7/6	6/-
$12 \times 7\frac{1}{2}$	5/-	7/6	15/-	30/-	15/-	30/-	60/-	9/6	6/9
12×10	5/-	7/6	15/-	30/-	15/-	30/-	60/-	9/6	6/9
15×12	7/6	10/-	20/-	35/-	17/6	35/-	70/-	13/6	8/9
$17 \times 10\frac{1}{2}$	7/6	10/-	20/-	35/-	17/6	35/-	70/-	13/6	8/9
16×13	9/6	11/-	21/-	36/-	18/6	36/-	72/-	16/-	10/-
18×15	13/-	14/-	25/-	40/-	20/-	38/-	76/-	17/-	12/-
20×16	16/-	16/-	27/-	42/-	22/-	40/-	80/-	18/9	12/6
24×18	21/-	20/-	30/-	45/-	25/-	45/-	90/-	22/6	13/6

COMPLETE PRICE LIST POST FREE ON APPLICATION.

ARGENTIC-GELATINO-BROMIDE WORKS,
Kew Foot Road, RICHMOND, S.W.

MORGAN & KIDD.

BROMIDE ENLARGEMENTS—On Paper.

SIZE.	Enlargement unmounted.	Enlargement rough mounted and spotted.	Enlargement rough mounted, spotted, and in best qual. cut mount.	Enlargement mounted on Plate Paper Mounts,* spotted.	Finished in BLACK AND WHITE EXTRA.			Painted in WATER OR OIL COLOURS EXTRA.		Solid Oak Frames, with gold slip, for Black and White or Water Colours.
					3rd Class.	2nd Class.	1st Class.	2nd Class.	1st Class.	
6½ × 4¾.....	1/3	1/6	2/-	2/-	2/6	5/-	10/-	10/-	20/-	2/9
8½ × 6½.....	2/6	3/-	3/6	3/6	5/-	10/-	15/-	15/-	30/-	3/6
12 × 10 } ...	2/6	3/-	3/9	3/9	5/-	10/-	15/-	15/-	30/-	4/9
12 × 7½ }										
15 × 12.....	3/-	3/9	4/9	4/9	6/-	12/-	18/-	21/-	40/-	6/-
17 × 10½ ...	3/-	3/9	5/-	5/-	6/-	12/-	18/-	21/-	40/-	6/-
18 × 15.....	4/-	5/3	6/6	6/6	7/-	14/-	21/-	30/-	47/6	7/-
23 × 17.....	5/-	6/3	7/6	7/6	7/6	15/-	22/6	40/-	55/-	9/6
24 × 18 } ...	6/6	8/-	10/-	10/-	10/-	20/-	30/-	50/-	70/-	10/6
24 × 20 }										
30 × 22.....	10/-	11/9	14/-	14/-	12/6	25/-	37/6	55/-	85/-	12/6
30 × 25.....	12/6	15/-	17/6	17/6	15-	30/-	45/-	60/-	100/-	13/6
36 × 28.....	15/-	20/-	27/6	27/6	20/-	40/-	60/-			17/6
40 × 30.....	17/6	23/6	...	..	22/6	45/-	67/6			40/-‡
50 × 30.....	20/-	35/-	...	...	25/-	50/-	75/-	per special quotation.	per special quotation.	45/-‡
60 × 30.....	25/-	40/-	...	...	30/-	60/-	90/-			65/-‡
48 × 36.....	25/-	40/-	...	...	30/-	60/-	90/-			65/-‡
60 × 40.....	35/-	52/6	...	...	35/-	70/-	105/-			84/-‡
96 × 50.....	65/-	96/.	...	...	70/-	140/-	210/-			148/-‡

* Plate Paper Mounts, with India tint and plate sunk, the most effective style of Mounting. When Prints are ordered on Plate Paper Mounts without Finishing, they are evened up and made presentable and charged accordingly (see Special List in this advt.) When this is not required they should be ordered 'Spotted only.'

‡ These sizes are framed in 4½-in. solid oak to 50 × 30, and in 6-in. ditto above that size, with gilt bevel sight-edge, Pattern 99.

Complete Price Lists post free on application.

MORGAN & KIDD.

ARGENTIC-GELATINO-BROMIDE WORKS, Kew Foot Road, RICHMOND, S.W.

CARBON ENLARGEMENTS

ON PAPER,

IN STANDARD BROWN, ENGRAVING BLACK, SEPIA, OR RED CHALK.

SIZE (approximate).	Printed Solid, Unmounted.	Extra Copies, Printed Solid, Unmounted.	Vignetted, Unmounted.	Extra Copies, Vignetted, Unmounted.	Rough Mounted on Cloth-board and Spotted, Extra.	* Mounting on India Tint and Spotting, Extra.	Mounting in Cut Mounts (including Rough Mounting and Spotting), Extra.	Finishing in Monochrome, extra.			Painted in Water or Oil Colours, extra.		Suitably Framed in Polished Walnut, with Gold Slip.†	Similar Frames in Oak.	No. and Width of Moulding.	
								3rd Class.	2nd Class.	1st Class.	2nd Class.	1st Class.				
6½ × 4¾	5/-	-/6	5/6	-/9	-/3	-/6	-/6	2/6	5/-	10/-	10/-	20/	3/9	2/9	21	⅜″
8½ × 6½	6/-	-/9	6/6	1/-	-/6	-/9	-/9	5/-	10/-	15/-	15/-	30/-	4/-	3/6	21	⅜″
10 × 8	6/6	-/10	7/6	1/1	-/6	1/3	1/3	5/-	10/-	15/-	15/-	30/-	5/6	4/-	59	1½″
12 × 7½ / 12 × 10	7/-	1/3	8/-	1/6	-/6	1/3	1/3	5/-	10/-	15/-	15/-	30/-	7/-	4/9	59	1½″
15 × 12	10/-	1/9	11/-	2/-	-/9	1/9	1/9	6/-	12/-	18/-	21/-	40/-	8/-	6/-	59	1½″
17 × 10½	10/-	1/9	11/-	2/-	-/9	2/-	2/-	6/-	12/-	18/-	21/-	40/-	8/-	6/-	59	1½″
18 × 15	13/6	2/6	14/6	2/9	1/3	2/6	2/6	7/-	14/-	21/-	30/-	47/6	9/6	7/-	60	2″
20 × 16	14/6	3/6	16/-	3/9	1/3	2/6	2/6	7/6	15/-	22/6	40/-	55/-	10/6	7/6	60	2″
23 × 17	15/-	3/9	17/6	4/-	1/3	2/6	2/6	7/6	15/-	22/6	40/-	55/-	14/6	9/6	60	2″
24 × 18	16/-	4/-	18/6	4/6	1/3	3/6	3/6	10/-	20/-	30/-	50/-	70/-	15/6	10/6	60	2″
24 × 20	17/6	4/6	20/-	5/6	1/3	3/6	3/6	10/-	20/-	30/-	50/-	70/-	15/6	10/6	60	2″
30 × 22	27/-	8/6	30/-	9/9	1/9	4/-	4/-	12/6	25/-	37/6	55/-	85/-	17/-	12/6	60	2″
30 × 25	33/-	10/-	36/6	11/-	2/6	5/-	5/-	15/-	30/-	45/-	60/-	100/-	19/-	13/6	60	2″
36 × 28	38/6	14/6	42/6	16/-	5/-	12/6	12/6	20/-	40/-	60/-	70/-	120/-	22/-	17/6	90	2½″
40 × 30	45/-	17/6	50/-	19/-	6/-	—	—	22/6	45/-	67/6	80/-	135/-	38/-	30/-	+92	3½″
44 × 34	55/-	22/-	60/-	24/6	10/-	—	—	25/-	50/-	75/-	90/-	175/-	47/6	35/-	+92	3½″
48 × 36	66/-	24/-	72/-	26/6	10/-	—	—	30/-	60/-	90/-	120/-	200/-	60/-	40/-	+92	3½″
53 × 36	73/-	27/6	80/-	30/-	10/-	—	—	35/-	70/-	105/-	140/-	220/-	66/-	45/-	92	3½″

* Best quality Mounts, faced with Plate Paper and Plate Marked, and with India Tint mounted on.
† Sizes from 6½ × 4¾ to 10 × 8 have ½-in. Gold Slip. From 12 × 7½ to 20 × 16—¾-in. From 23 × 17 to 36 × 28—1-in. Sizes 40 × 30 and larger are framed without mount margin and have 2-in. gold sunk bevel matts.

ARGENTIC-GELATINO-BROMIDE WORKS,
Kew Foot Road, RICHMOND, S W

✤ MORGAN & KIDD. ✤

CARBON ENLARGEMENTS ON OPAL,

In Standard Brown, Engraving Black, Sepia, or Red Chalk.

Size.	Plain Enlargement, Solid, or Vignetted.	Extra Copies, Solid or Vignetted.	Finishing in Monochrome, Extra.			Painting in Water Colours, Extra.			Suitable Frames.				Price.
			3rd Class.	2nd Class.	1st Class.	3rd Class.	2nd Class.	1st Class.	No. and Description of Patterns.				
6½ × 4¾	5/6	1/-	2/6	5/-	10/-	5/-	10/-	20/-	...	Morocco Case...	...	...	10/-
8½ × 6½	6/6	1/6	5/-	10/-	20/-	10/-	20/-	40/-	...	,,	,, ...	...	17/6
10 × 8	8/-	2/-	6/-	12/-	24/-	12/-	25/-	50/-	...	,,	,, ...	...	21/-
12 × 7½	9/-	3/-	7/6	15/-	30/-	15/-	30/-	60/-	350	Brown & Gold, with S.B.M.	...		13/-
12 × 10	9/-	3/-	7/6	15/-	30/-	15/-	30/-	60/-	350	,,	,,	...	13/-
15 × 12	13/-	4/-	10/-	20/-	35/-	17/6	35/-	70/-	350	,,	,,	...	16/-
17 × 10½	13/-	4/-	10/-	20/-	35/-	17/6	35/-	70/-	350	,,	,,	...	16/-
16 × 13	15/-	5/-	11/-	21/-	36/-	18/6	36/-	72/-	459	,,	,,	...	21/9
18 × 15	20/-	7/-	14/-	25/-	40/-	20/-	38/-	76/-	459	,,	,,	...	24/-
20 × 16	24/-	9/-	16/-	27/-	42/-	22/-	40/-	80/-	459	,,	,,	...	24/6
24 × 18	30/-	14/-	20/-	30/-	45/-	25/-	46/-	90/-	459	,,	,,	...	26/-
33 × 26	50/-	27/6	40/-	60/-	80/-	60/-	90/-	120/-	460	,,	,,	...	66/-

FRAMING. For large variety of Frames see General Catalogue, pages 25 to 32.

COMPLETE PRICE LISTS POST FREE ON APPLICATION.

ARGENTIC-GELATINO-BROMIDE WORKS, Kew Foot Road, RICHMOND, S.W.

MORGAN & KIDD.

MORGAN & KIDD.

PLATINOTYPE ENLARGEMENTS ON PAPER.

SIZE (approximate).	Printed Solid, Unmounted.	Extra Copies, Solid, Unmounted.	Vignetted, Unmounted.	Extra Copies, Vignetted, Unmounted.	Rough Mounted on Mill-board and Spotted, extra.	* Mounting on India Tint Mounts and Spotting, extra.	Mounting in Cut Mounts inclusive of Rough Mounting and Spotting, extra.	Finishing in Monochrome, Extra.			Painted in Water or Oil Colours, Extra		Suitably Framing in Polished Walnut, with Gold Slip †	Similar Frames in oak.	No. and Width of Mounting.	
								3rd Class.	2nd Class	1st Class.	2nd Class.	1st Class.				
6½ × 4¾	5/6	1/-	6/-	1/3	-/3	-/6	-/6	2/6	5/-	10/-	10/-	20/-	3/9	2/9	21	¾ in.
8½ × 6½	7/-	1/9	7/6	2/-	-/6	-/9	-/9	5/-	10/-	15/-	15/-	30/-	4/-	3/6	21	¾ in.
10 × 8	7/6	2/-	8/6	2/3	-/6	1/3	1/3	5/-	10/-	15/-	15/-	30/-	5/6	4/-	59	1½ in.
12 × 7½ } 12 × 10 }	8/-	2/3	9/-	2/6	-/6	1/3	1/3	5/-	10/-	15/-	15/-	30/-	7/-	4/9	59	1½ in.
15 × 12	12/-	3/6	13/-	3/9	-/9	1/9	1/9	6/-	12/-	18/-	21/-	40/-	8/-	6/-	59	1½ in.
17 × 10½	12/-	3/6	13/-	3/9	-/9	2/-	2/-	6/-	12/-	18/-	21/-	40/-	8/-	6/-	59	1½ in.
18 × 15	17/-	6/-	18/-	6/3	1/3	2/6	2/6	7/-	14/-	21/-	30/-	47/6	9/6	7/-	60	2 in.
20 × 16	17/6	6/6	19/-	6/9	1/3	2/6	2/6	7/6	15/-	22/6	40/-	55/-	10/6	7/6	60	2 in.
23 × 17	19/6	8/6	22/-	8/9	1/3	2/6	2/6	7/6	15/-	22/6	40/-	55/-	14/6	9/6	60	2 in.
24 × 18	21/-	9/-	23/6	9/6	1/5	3/6	3/6	10/-	20/-	30/-	50/-	70/-	15/6	10/6	60	2 in.
24 × 20	23/-	10/-	26/-	11/-	1/3	3/6	3/6	10/-	20/-	30/-	50/-	70/-	15/6	10/6	60	2 in.
30 × 22	36/6	13/6	40/-	14/6	1/9	4/-	4/-	12/6	25/-	37/6	55/-	85/-	17/-	12,6	60	2 in.
30 × 25	38/6	15/6	42/-	16/6	2/6	5/-	5/-	15/-	30/-	45/-	60/-	100/-	19/-	13/6	60	2½ in.
36 × 28	45/-	21/-	49/-	22/6	5/-	12/6	12/6	20/-	40/-	60/-	70/-	120/-	22/-	17.6	90	2½ in.
40 × 30	52/6	25/-	57/6	26/6	6/-	—	—	22/6	45/-	67/6	80/-	135/-	38/-	30/-	†92	3½ in.
44 × 34	64/6	31/6	69/6	34/-	10/-	—	—	25/-	50/-	75/-	90/-	175/-	47/6	35/-	†92	3½ in.
48 × 36	78/-	36/-	86/-	38/6	10/-	—	—	30/-	60/-	90/-	120/-	200/	60/-	40/-	†92	3½ in.

* Best Quality Mounts, faced with Plate Paper and Plate Marked, and with India Tint mounted on.

† Sizes from 6½ × 4¾ to 10 × 8 have ¼-in. Gold Slip. From 12 × 7½ to 20 × 16, ¾-in. From 23 × 17 to 36 × 28, 1-in. Sizes 40 × 30 and larger are framed without mount margin, and have 2-in. gold sunk bevel matts.

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Crown 4to.	10 × 7½	7 ×5	1	11	6	2	0	0	2	14	0	3	11	6	6	6	6	0	15	0
Demy 4to.	11½× 8½	8 ×6	1	17	0	2	9	0	3	6	6	4	6	6	7	16	6	0	16	0
Royal 4to.	12½×10	9 ×7	2	1	6	3	0	0	4	2	6	4	17	6	8	17	6	1	0	0
Imprl. 4to.	15 ×11	10½×8½	2	8	0	3	11	0	4	13	0	6	14	0	12	8	0	1	2	6
Foolscap ...	17 ×13½	11½×9½	2	18	0	4	5	6	5	8	0	7	18	0	14	8	0	1	7	6
Crown ...	20 ×15	14½×11½	3	8	6	5	1	0	6	11	0	9	11	0	16	11	0	1	12	0
Demy ...	22½×17½	16×13	4	0	6	5	15	6	8	5	6	11	5	6	20	15	6	1	18	0
Royal	25 ×20	18×15	4	7	0	6	4	0	9	16	0	14	6	6	25	16	6	2	4	0
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[*See preceding pages.*



THE PIONEER OF HAND CAMERAS.



SHEW'S ECLIPSE.

CODE B.—The Camera, fitted with Shew's Patent Central Shutter to the Lens, patent fine focussing flange, scaled for hand work and for time exposures on stand, for which screw fittings to camera are provided, three best double backs for glass plates or for cut films, and focussing screen, the Eclipse finder fitted for horizontal and vertical work, the whole in solid leather case, with good lock, handle, and sling straps:—

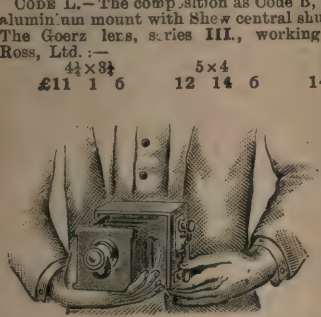
4½×3½.	5×4,	6½×4¾,	7½×5,	8½×6½
£7 10 0	£8 8 0	£10 0 0	£11 14 6	

CODE C.—The same composition as above, with special rising front for architectural work in confined situations:—

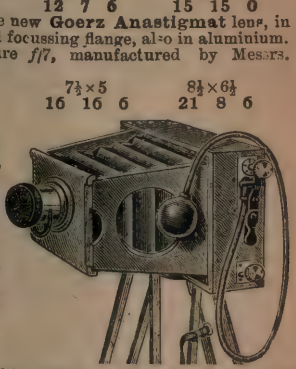
4½×3½	5×4	6½×4¾	7½×5	8½×6½
£8 12 6	9 8 6	11 5 0	12 7 6	15 15 0

CODE L.—The composition as Code B, with the new **Goerz Anastigmat** lens, in aluminium mount with Shew central shutter and focussing flange, also in aluminium. The Goerz lens, series **III.**, working aperture *f*/7, manufactured by Messrs. Ross, Ltd.:—

4½×3½	5×4	6½×4¾	7½×5	8½×6½
£11 1 6	12 14 6	14 5 6	16 16 6	21 8 6



THE Focal Plane Eclipse.



CODE N.—THE FOCAL PLANE ECLIPSE.—In this pattern we have constructed the Thornton Focal Plane Shutter within the Camera, thus reducing the Camera, inclusive of shutter, to the following small dimensions:—

For 4½×3½ 6×4½×2, weight 1 lb. For 6½×4¾ 8½×6½×2½, weight 1½ lb.

The Camera, with speed indicator and finger release in addition to the pneumatic, three best book-form backs, focussing screen, screws for tripod, and focussing flange, complete, with Eclipse lens, Iris diaphragms:—

4½×3½	5×4	6½×4¾	7½×5	8½×6½
£7 19 6	9 1 6	10 12 6	11 15 0	13 18 6

With the Ross-Coerz Lens, Iris diaphragms:—

4½×3½	5×4	6½×4¾	7½×5	8½×6½
£10 15 0	12 8 6	14 5 0	17 0 0	19 19 0

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THE XIT.

Only Camera for Pictures $4\frac{1}{4} \times 3\frac{1}{4}$ easily carried in the Breast Pocket.

THE HALF-PLATE 'XIT.'

Camera, Lens, Screen, Three Double Backs and Clear Finder.

Weight $2\frac{1}{2}$ lbs.

To the Cyclist requiring a complete, practical outfit, we recommend the above, with six 'XIT' Double Backs for cut films or glass plates; and our 'XIT' Film Storer with 100 cut films placed ready for use, the Storer being air-tight and light-tight; the Double Backs being so simple that they can be filled in the dark, and holding the film firmly all round, so obviating the danger of dust from jarring on the road. No troublesome operation of filling in sheaths and a certainty of results not obtainable with Magazines of the most careful construction. These Cameras are so small and light that the Cyclist will find no inconvenience in carrying a quarter plate slung on the back. Camera and Backs are all Aluminium bound.



The 'Xit,' with Extension.

THE 'XIT.'

	$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$
Complete with 3 Double Backs and Focussing Screen, Eclipse Lens $5\frac{1}{2}$ in. *f*/8, patent Central Shutter, Focussing Flange, View Finder, Fittings for Tripod, and Solid Leather Case	£8 0	10 0 0	12 12 0
The Goerz Lens and Accessories, as above ...	10 10 0	12 10 0	15 10 0
The Zeiss Lens ditto ditto	11 10 0	13 10 0	16 10 0
The Dallmeyer Stigmatic ditto ditto ...	12 10 0	14 10 0	17 0 0
Universal Swing Back, giving adjustment in every direction, and fitted with Special Aluminium Fittings, detachable base board, with folding screws ... ... extra	1 15 0	2 2 0	2 10 0
The 'Xit' Extension or Lengthening Back, for doubling the focal length of the camera for work with the single lens detachable, with base board, forming a rigid long-focus camera for special work, all aluminium fitted	2 2 0	2 5 0	2 10 0
The Shewgraph Magazine Back, for 60 cut films or for 12 glass plates, fitted to the above for	2 10 0	2 10 0	3 5 0

'XIT' DARK SLIDES OR DOUBLE BACKS.

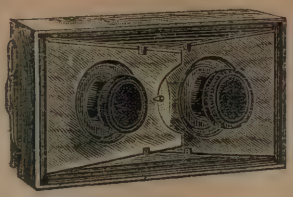
Extra Backs to the 'Xit' Cameras.

	$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$
In Sets of Three	1 5 0	1 10 0	1 15 0
,, Six	2 8 0	2 17 6	3 7 0

J. F. SHEW & CO., 87 & 88 Newman St, London, W.

J. F. SHEW & CO.

Weighs, including Two Goerz Lenses and Shutter, only 1¼ lbs.



Dimensions, closed, only 7⅛ × 5½ × 1½. For pictures 4¼ × 3¼.

THE TWIN-LENS 'XIT.'

This is undoubtedly the most compact and smallest Twin-lens Camera ever made.

Folding—Focussing—For Hand or Stand.

The Camera all ALUMIMIUM bound, with Rising Front, three 'Xit' Double Backs Aluminium bound, Screen with folding Focussing Hood, fittings for Tripod and solid Leather case. LENSES MOUNTED IN ALUMINIUM in Focussing Flange, scaled for Hand Exposures and finely focussing for Stand work, as follows :—

With ECLIPSE LENSES, 5½ in. F/8	**£12 12 0**
,, GOERZ LENSES, 5 in. F/7.7	**17 17 0**

THE HALF-PLATE TWIN-LENS XIT.

For pictures 6½ × 4¼. GLASS OR CUT FILM.
Dimensions closed, including two Lenses, 11 × 8 × 2¼.
Weight with Lenses, 2lbs. 6ozs.

With ECLIPSE LENSES, and all Accessories as above	**£18 10 0**
,, GOERZ LENSES, ... ditto	**24 10 0**

THE JUNIOR XIT.

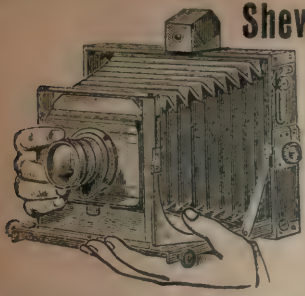
No. 1. For Plates or Cut Films, 3¼ × 2½, half Quarter-plate ...	**£2 10 0**
No. 2. Ditto, 3½ × 2½, the Continental half Quarter-plate	**3 3 0**



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(Patent).

A Hand Camera. A Stand Camera.
A Wide-Angle Camera.
A Long-Focus Camera.

For horizontal or vertical pictures.

A Camera for Half-plate or 6½×4¾ in., weighing only 27 ounces, measuring when closed 8×6½×1¾.

Cape Colony, Nov. 16th, 1896.

'I am much pleased with the "Featherweight" Camera.'

India, July 25th, 1897.

'In May, 1895, I purchased one of your "Featherweight" Cameras. IT IS A SPLENDID CAMERA, and has stood the STEAMY DAMP CLIMATE OF ASSAM without the slightest sign of warping, cracking, OR BECOMING LOOSE IN THE JOINTS.'

SHEW'S REFLECTOR CAMERA.

A full-sized Finder and Camera in one.



The *actual image is seen at the moment of exposure.* This camera is entirely different from any of the reflecting cameras hitherto made, in its simplicity and absence of costly complications, requiring only to be seen to be understood. *A child can use it.* The only directions required are:—Depress the lever, which sets the lens shutter, draw the slide shutter, and *press the button.*

THE REFLECTOR No. 1.—For pictures 4½×3¼, with reversing frame for horizontal or for vertical pictures, measuring 8¾×5½×5¼. Neatly bound in leather, with strong carrying handle, Shew extra-rapid Rectilinear Lens, and three double backs ... complete **£4 4 0**

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We are sole agents for these Lenses, which have been highly recommended by such well-known authorities as W. K. Burton and Alfred Maskell, as placing within the reach of all Amateurs the power of obtaining artistic pictures, either portrait or landscape, varying in size from 6½ to 12 inch, at a trifling cost.

MODEL A.—A set of 6 Lenses, 1¾in. focal lengths, equivalent to about 8, 10, 12, 16, 18, and 20 inches, easily interchangeable, and 7 diaphragms, varying from about 1/32 of an inch to 1 inch. A mount, having a friction ring at the back end, which makes it possible to slip any one of the eight lenses into position **£1 1 0**

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New Camera List for 1898 free of

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[*See following page*

WHAT The KORESCO WILL DO.

WITH the whole-plate Koresco you can make Enlargements from Pocket Kodak, Frena, or quarter-plate negatives to half-plate or whole-plate, on bromide paper or on glass. You can Reduce whole-plate or half-plate negatives to quarter-plate, or $3\frac{1}{4} \times 3\frac{1}{4}$.

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Whole-plate Koresco includes Camera; Rack Focus arrangement ($3\frac{1}{4}$ focus); Achromatic Lens; whole-plate Book Slide; one half-plate Carrier. Price complete, for Enlarging only, **30/-**

Quarter-plate Slide with Carrier, for making Lantern Slides, **5/-** extra.

15×12 Koresco includes Camera; Rack Focus arrangement (one $3\frac{1}{4}$ and one $8\frac{1}{2}$), Achromatic Lenses; 16×13 single Slide; 15×12, 12×10, 10×8 and whole-plate Carriers; Board to carry 16×13 or smaller sizes of bromide paper. Price complete, for Enlarging only, **72/-**

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NOTE.—It is advisable to Focus with open aperture, but put on Stop before exposing.

Smaller or larger Stops may be made of cardboard placed inside the Cap.

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Enlarging & Reducing

CAMERA.



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THE KORESCO CAMERA

IS MADE IN TWO SIZES.

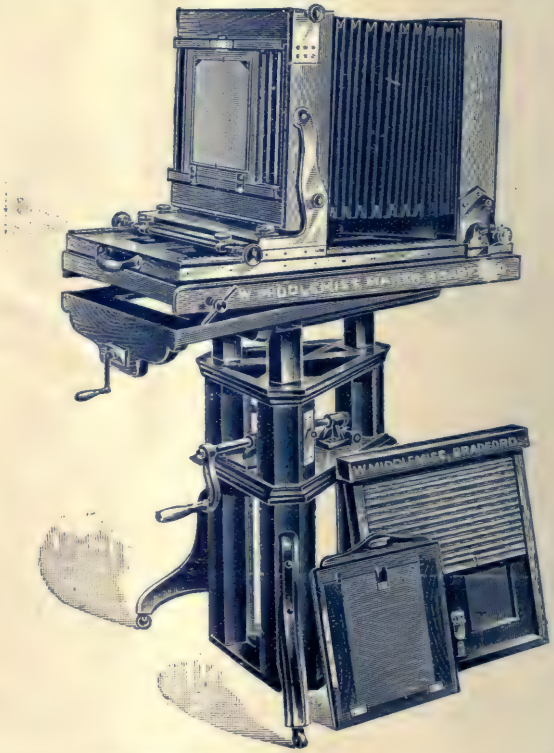
Quarter-plate complete for Enlarging and Reducing ... ... Price **35/-**

15 × 12 " " " " ... ... Price **80/-**

It is made of Mahogany throughout and of the best workmanship.

NOTE. — Any article sent to any part of the kingdom carriage paid (no charge for packing), on receipt of the net amount specified.

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CAMERA & STAND.



15 × 12 Size kept in Stock. Price Complete ... £22

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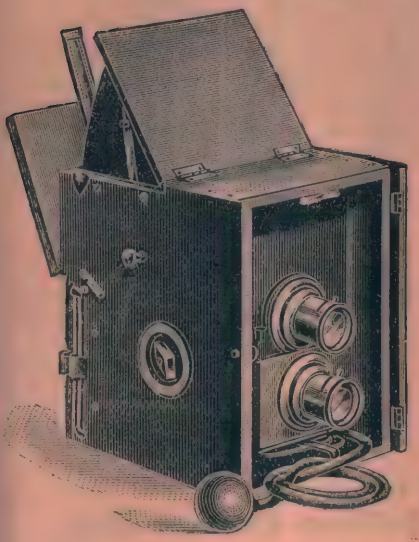
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To the Trade only.

The R R "Record" Twin-Lens Camera (Improved).



This Camera is, without doubt, one of the very best Twin-Lens Cameras ever devised. It is much smaller than the majority of those on the market, and is better made although very low in price. The Body is of seasoned Walnut or Mahogany and covered with Leather, and has Rack and Pinion Adjustment. The Back also opens up, and the picture can be focussed direct on to the screen in the usual manner. A small spring trap-door is fitted into the front of Camera, so that it is not necessary to open up the whole front for use. Fitted with Thornton-Pickard Time and Instantaneous Shutter and a pair of selected Achromatic Rectilinear Lenses with Iris Diaphragms, working at f/8, with 3 solid Dark Slides.

Price complete **£6 0 0**

"Record" Twin-Lens Camera at 31/6.

Polished Walnut Body, with pair of first quality Achromatic Meniscus Lenses, Time and Instantaneous Metallic Shutter, and 1 Double Dark Slide, for **31/6.**

Extra Double Slides for "Record" Cameras, **4/-** *each.*

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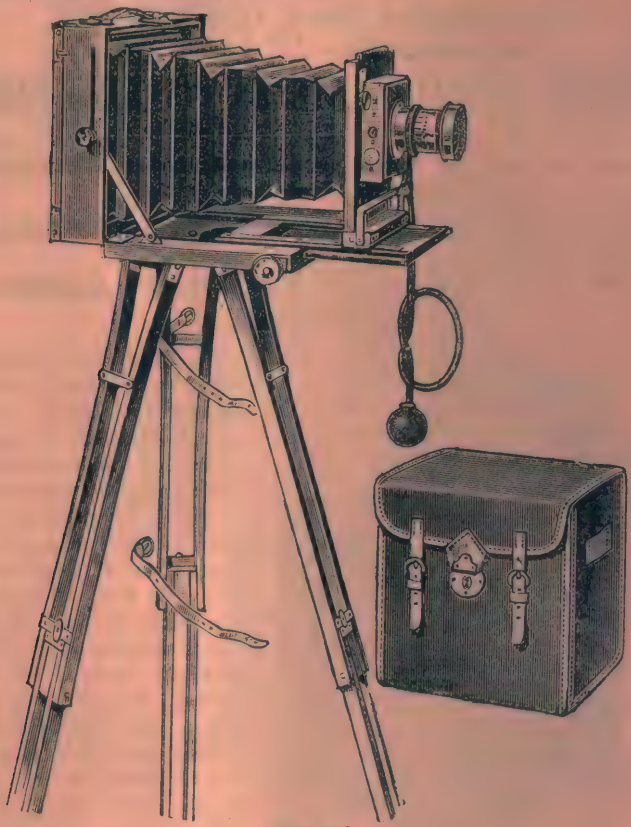


Fig. 248.

The "Tivoli" ½-Plate Camera Sets.

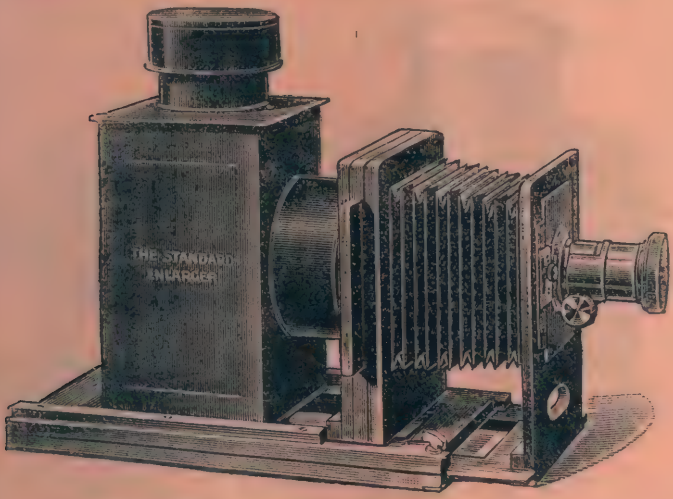
	£	s.	d.
No. 1 comprises Camera, as Fig. 248, fitted with Thornton-Pickard Shutter, Rapid Rectilinear Lens with Iris Diaphragm, one Double Dark Slide, and two-fold Tripod	3	7	6
No. 2 Outfit, as above, but with three-fold ash Tripod and stiff canvas case with lock and key	4	0	0
No. 3 Outfit, as No. 1, but with wide-angle movement to Camera...	3	10	0
No. 4 ditto, ditto, with three-fold Tripod and Camera case	4	2	6

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The Standard Enlarger.

A new form practical **Enlarging Lantern,** made of American Walnut, well finished, with Cloth Bellows and Sliding Base with Fixing Screw, Rising Front for adjustment of Lens, Russian Iron Body, made perfectly light-tight. Carrier to take Negatives either Vertical or Horizontal.

Fitted complete with new form Tray and Rod for either Incandescent Gas Burner or for Limelight. Also now made with Oil Lamp.

The 5½-inch Enlarger is now fitted with Blocks so as to take a Carrier for Projecting Lantern Slides.

Extra for 4-inch Compound Condenser and Adapter, **10/6.**

NOTE.—*Larger sizes of these Lanterns made to order.*

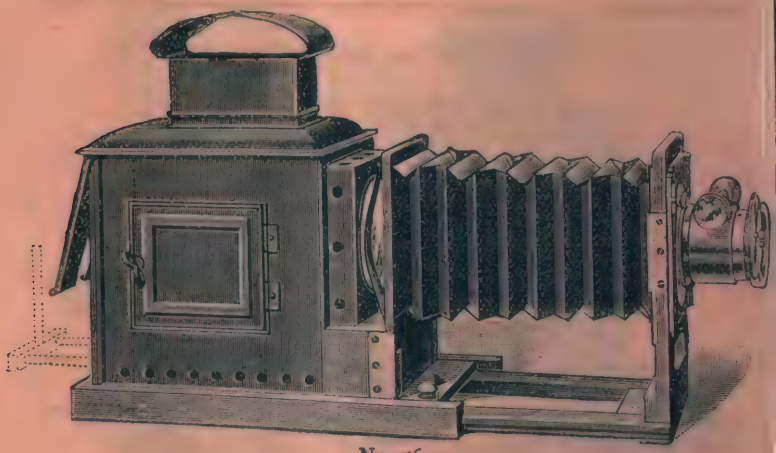
Prices on application.

PRICES.	5½-inch. £ s. d.	8¼-inch. £ s. d.
No. 94.—Lantern, with Condenser, Carrier and Tray	3 8 0	6 17 4
No. 95.—Ditto, ditto, Jet for Incandescent Burner, Mantel and 1 Chimney	4 4 0	7 13 4
No. 96.—Ditto, ditto, and Double Achromatic Projecting Lens, with Yellow Glass Cap and Set of Stops	5 0 0	9 6 8
No. 97.—Lantern, with Condenser and specially made Oil Lamp (no Lens)	3 15 0	6 17 4
No. 98.—Ditto, ditto, with Lens, etc.	4 15 0	9 6 8

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No. 56.

The Standard Optical Lantern.

The best and most Improved Model for Schools, Institutions, and Scientific Experiments.

The Body is made of Russian Iron, rivetted throughout, and the Base and Extending Front is of beautifully Polished Walnut, with Brass Fittings; the Bellows is removable for Scientific Experiments, and it has a loose Lens Board. It is specially adapted for either Limelight, Incandescent Gas, or Acetylene. The Jet support is fitted in by a pair of parallel tubes, which renders it perfectly steady and easy to adjust. The front will extend to 12 inches, and is fixed by a Clamping Screw. Brass adjustment to stage for centreing.

PRICES (include Box but no Jets).	£	s.	d.
No. 55.—With 4-inch Compound Condenser and Double Achromatic Front Lens with large size Back Combination and Flashing Shutter, complete in stout Travelling Box with Leather Handle	3	18	0
No. 56.—Ditto, ditto, with Brass Jacket for Interchangeable Lenses, and 1 Double Achromatic Lens for same, any focus from 4 to 14 inches	4	10	0
Extra Lenses for ditto, any focus, each...		12	0
Extra for Meniscus Double Achromatic Condenser in place of Plano-Condenser		5	0

Rack Adjustment to Standard Lantern, price 10/- *extra.*

Lamps for Standard Lantern.

3 or 4 wick Lamps can be fitted to the Standard Lantern if desired, in place of the Jet Fittings. Prices of Lamps, see Lantern Catalogue.

WRITE FOR CATALOGUES.

The "Challenge,"

Series of Cameras manufactured by

J. LIZARS,

OF

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EDINBURGH: 2 and 4 Maitland Street.
BELFAST: 73 Victoria Street.
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FACTORY:—
GOLDEN ACRE WORKS, CRAIGNESTOCK ST., GLASGOW.

BEFORE PURCHASING SEE A "CHALLENGE" CAMERA.

YOUR DECISION WILL CERTAINLY BE A "CHALLENGE."

Are the finest that can be produced. They are known all over the world, are in use by the best amateurs, and their enormous success is due to their convenient form, and being Simple, Compact, Practicable, Rigid, and above all *Thoroughly Reliable.*

All my Novelties cannot be enumerated here, but early in February, 1898, a list will be published containing a host of New Instruments and improvements such as "DAY LIGHT ROLL-HOLDERS" to fit any Camera—¼-PLATE DAY LIGHT FOLDING CAMERA, ¼-PLATE DAY LIGHT MAGAZINE CAMERA, ¼-PLATE INTERCHANGEABLE MAGAZINE CAMERA, &c., &c., &c. *Write for New List Free.* The "Challenge" is the most popular Series of Cameras ever known.

LIZARS' "CHALLENGE" MAGAZINE CAMERA.

The smallest made.

Carries Twelve Plates or Films.



The Shutter is always set, and has speed indicator attached; it works also at 'time.' The diaphragms rotate inside the Camera, but are set from the outside, and the one in the lens is indicated on a scale. It is fitted with brilliant view finders, one for horizontal, and the other for vertical pictures. These require no shading in the brightest weather. The changing of the plates is instantly done, and is absolutely certain in action. Covered in best leather, ¼-plate size, and fitted with a high-class View Lens, 42s.; with Rapid Rectilinear Lens, 65s.; with Taylor and Hobson D Lens, 84s.; with Ross Lens, 100s., with Goerz Lens, 140s.

See following pages.

LIZARS' "CHALLENGE" HAND CAMERAS.

The Editor of "Practical Photography" writes:—"I am delighted with your "Challenge" Cameras, the ¼-plate and the Stereoscopic, both of which I carried with me at the Convention; were greatly admired and much envied."

The Sub-Editor of "Photography" writes:—"*Your Camera fulfils* its full purpose. It is very *compact* indeed, and a *very cleverly contrived instrument*. It is *plainly* on the face of it *a Camera*. I *like* the dark slides *very much*, and I *like* the *Camera* ever so much *better* because it is so *handy* for the *stand*."

"The Amateur Photographer" says:—"The Camera is *very compact*, and is at once a *universal* one, which we can *well recommend*. It can be used *equally* well for *snap shots* or *stand work*."



Fig. 1.



Fig. 2.

The "Challenge" Hand Camera is the smallest, most portable and most *serviceable* Hand or Pocket Camera in the *world*, and *absolutely* free from complications. It has the best features of all the so called *best* Cameras, as well as the following, viz.:—The front of the Camera is a best quality Thornton-Pickard Shutter, to work either time or instantaneous, and to which is fitted a Speed Indicator. The front is a rising and falling one, to which the bellows is attached, thus preventing any cutting off of the picture. The Focussing is adjusted by rack and pinion, and the different distances at which the Lens is in focus are marked off from 3 to 30 feet. The Bellows is of first quality leather, the folds being three-ply. The Camera is fitted with Swing Back having an Indicator attached to show when the Camera is plumb. The body is of thoroughly-seasoned mahogany and beautifully polished. The brass-work is of the best quality and nicely lacquered. Attached to the focussing screen is a folding hood or cap, which does away with any need of a focussing cloth. The Camera when closed forms its own carrying case, and can be had either in leather or polished mahogany. Fig. 1 shows the Camera closed, ready for the pocket or carrying case; Fig. 2 shows the Camera on stand with focussing hood extended, also pneumatic release attached (this is supplied with all Cameras); which enables time or instantaneous pictures to be taken with greater ease. The Camera is fitted with adapters to screw on to a stand, and may be used to take either horizontal or vertical pictures.

NOTE.—The Eastman-Walker Roll Holder can be fitted to these Cameras on a few minutes' notice, and as they are capable of holding Spools to take sixty exposures, they are invaluable to tourists. Price for fitting Roll Holder to Camera, 5s.

PRICES.

Including three Best Double Dark Slides and Focussing Screen ($3\frac{1}{4}\times4\frac{1}{4}$)	£	s.	d.
¼-pl size. with a best R.R. Lens, with Iris Diaph., working at F/8,	4	10	0
Do., with Taylor, Taylor & Hobson's D Lens, ...	5	10	0
Do., with Ross Lens, ...	7	0	0
Do., with Goerz Lens.	9	0	0
5×4, as above, with R.R. Lens, ...	5	10	0
Do., with Taylor, Taylor & Hobson's D Lens, ...	7	10	0
Do., with Ross Lens, ...	9	0	0
Do., with Goerz Lens, ...	10	5	0
6½×4¾ (half-plate), as above, with R.R. Lens, ...	8	0	0
Do., with Taylor, Taylor & Hobson's D Lens, ...	9	0	0
Do., with a Goerz Lens, ...	11	0	0

For Camera and Shutter only, ¼ pl., £3, 5×4, £4, ½-pl., £5; Camera, Shutter, and three Slides, ¼-pl., £4, 5×4, £5, ½-pl., £6; single Slides, ¼-pl., 8s., 5×4, 9s., ½-pl., 11s.

Carrying Cases, Solid Leather, with Lock, to hold Camera (closed), and three Slides.

Size, ...	4½×3¼	5×4	6½×4¾	To hold Camera and 6 Slides, ...	Size,	4½×3¼	5×4	6½×4¾
Price, ...	12s. 6d.	14s.	18s.		Price,	14s.	17s. 6d.	20s.

EXTRAS—If fitted with Double Extension Side-swing and Cross Front, an additional charge of 40s.

The above Camera is also made in (3¼×3¼) Lantern Plate size, price same as ¼-plate

See preceding and following pages.

LIZARS'
"CHALLENGE' STEREOSCOPIC CAMERA.



PRICES.

Fitted with Laverne Rapid Rectilinear Lenses, ...	£10 0 0
Do. Taylor, Taylor & Hobson's D Lenses,	12 10 0
Do. Goerz, ...	17 0 0
For Camera and Shutter only, ...	6 0 0
For Camera, Shutter and 3 Slides, ...	7 0 0
For Single Slides, 11/ each, Per set of 3, ...	1 13 0
Carrying Cases, Solid Leather, with Lock to hold the Camera when closed, with 3 Slides, ...	1 0 0

Also made with Double Extension, Side-swing and Cross Front, at an additional charge of 40/.

For description see under heading LIZARS' "CHALLENGE" HAND CAMERAS, opposite Page.

LIZARS' FOCAL-PLANE
"CHALLENGE" HAND CAMERAS.

(With screwed sockets to attach to a Stand if desired In either the horizontal or vertical position.)

CAN BE EXTENDED FOR USE INSTANTLY.



Made throughout in the highest class of workmanship, body made of finest polished mahogany, brass work hand-finished and lacquered. It is fitted with rising and falling front, to which the bellows is attached, thus preventing any cutting off of the picture, swing back with plumb indicator attached. The focussing screen has attached to it a folding hood, which serves the purpose of a focussing cloth, and at the same time protects the glass screen (this can be seen extended in some of the preceding cameras). The shutter, with speed indicator attached, can be used for 'time,' and up to the 1000 part of a second. The focussing is adjusted on an ivory scale by rack and pinion. The Camera when closed forms its own carrying case, all the parts being covered. Altogether these Cameras are a distinct advance on any other form of focal-plane, and much less in price.

PRICES for ¼-plate with high-class R.R. Lens, with Iris Diaphragm working at F/8, £5 10s. With Taylor & Hobson's D Lens, £6 10s., With Ross Lens, £8. With Goerz Lens, £10. In 5×4 sizes—£6 10s., £8 10s., £10, and £11 5s. respectively. In ½-plate, £9, £10. and £12.

See preceding and following pages.



When open extends to 17 *in.*
When closed only measures $1\frac{3}{4}$ *in.*

LIZARS' NEW "CHALLENGE."

Complete ½-Plate Outfit, £3:10s.

Comprising Camera in **finest Spanish** Mahogany, not the **commoner** Honduras, book-form slide, with triple-hinged rebated shutters and automatic catches, rapid rectilinear iris lens of extra fine covering power. Thornton-Pickard shutter, and rigid folding tripod, all of the **very finest workmanship and finish.** Camera extends to 17 in., and folds up to $1\frac{3}{4}$ in. Has every movement. Rigid, and no loose parts. Camera, lens, and shutter all fold up together. **PRICE,** half-plate size, **£3:10s.**; full-plate size, **£5:10s** Equal to anything on the market **at double** these prices.

Read the Verdict of Photographic Journals on the New "Challenge" Outfit.

The Amateur Photographer.—"The New 'Challenge' Stand Camera is a model of good workmanship and general efficiency, and comprises all the essential movements included in the highest priced instruments."

The Photographic News.—"It is well made, and is one of the cheapest and best sets we have seen."

The Photographic Dealer.—"We must confess our complete surprise at the value offered in this set, for up to within a few weeks ago no one dreamed of purhasing such a set for anything like the price."

LIZARS' TWIN-LENS "CHALLENGE" CAMERA.

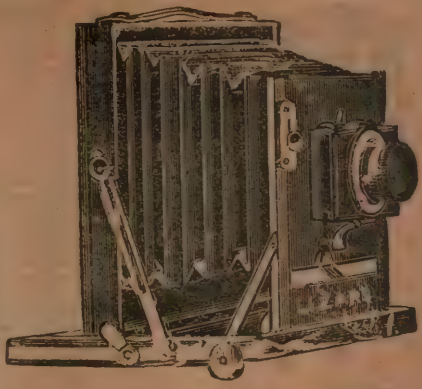


Made in Spanish mahogany, and covered in best black leather; focusses by rack and pinion. The shutter is a Thornton-Pickard Time and Instantaneous one, with speed indicator attached. Can be used equally well for hand or stand work, and for both purposes very greatly improved focussing hoods, so as to most perfectly shade the ground glass, are attached—a great desideratum, especially when snap-shooting.

Advantages derived by using the Twin-Lens Camera: **The object to be photographed can be focussed up to the last moment of exposure. The full size of the subject being on view, composition is possible, and correct centreing, so desirable when photographing yachts, etc., is a certainty. When used on a tripod it is in every way as handy and as complete as a ordinary field camera. With such an instrument the beginner cannot make failures.**

PRICE: Quarter-plate size, including shoulder strap, three best slides, or roll-holder, all of the *very finest* quality, with pair of first-class Iris R.R. lenses, £8 8s.; with pair of Taylor and Hobson's D. lenses, £10 10s.; with pair of Ross lenses, £12; with pair of Ross-Goerz' lenses, £13 13s.; ditto in 5x4 size, £11 10s., £15 15s., £17, and £18 18s.; ditto, in half-plate size, £13 13s., £18 18s., and £22 10s.

LIZARS' "CHALLENGE" COMBINATION CAMERA.



OPEN.

Has novel features not to be found in ordinary cameras. The instrument is self-contained, having the Lens, Shutter, etc., all attached to the Camera, therefore no loose parts to leave behind when going on a tour. The camera is of the first quality, having every movement necessary for the highest class of Photography, and is one of the most compact and rigid made. The slide is book form, with automatic closing springs. The Shutter is a Thornton-Pickard one, working for both Time and Instantaneous work, and having a Speed Indicator attached (List price alone 22s.) The Lens is an improved Rapid Rectilinear one, with best form of Iris Diaphragm and works at F 8.

The Stand is three-fold, and of the most portable and rigid description. The case is of waterproof canvas, with hand and shoulder straps attached.



CLOSED.

PRICE.

Complete, with R.R. lens, half plate size, £5; with a Taylor, Taylor and Hobson's R.R. lens, £6. If fitted with Turntable, 15s. extra.

Also made in a cheaper but thoroughly reliable form with drop shutter having adjustable speeds, with R.R. Lens, £4 12s. 6d. With Taylor & Hodson's R.R. Lens, £5 12s. 6d. Full plate sizes, with R.R. Lens, £7. 12×10 size, £11 10s. 15×12 size, £13 10s.



(PATENT)

LIZARS' "PERFECT" CHANGING BOX.

IMPORTANT FEATURES.

No bags, no sheaths, no jamming, no scratching, no fingering of the plates, no mechanism to go out of order.

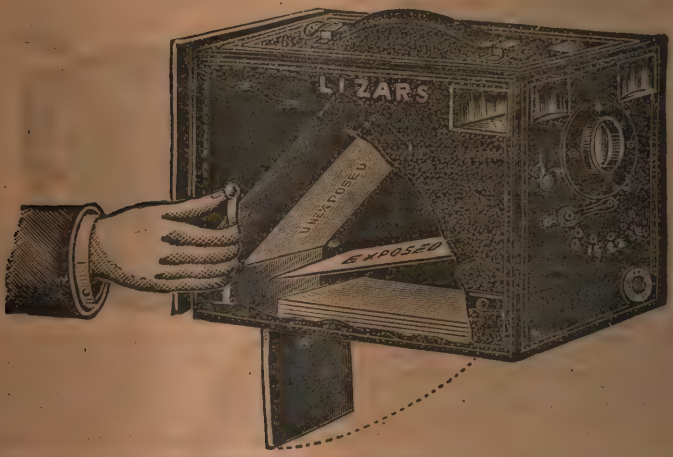
The size of the box is 5½ in. long, 4½ in. broad, and 2½ in. deep, or rather less than the bulk of three double dark slides, and it will hold thirty plates or forty films. Only one plate is attached to the Camera, thus doing away with the great weight of thirty plates hanging on to the back of camera, which is a serious fault with all other forms of changers.

For tourists or any one going on a short holiday it is invaluable, as you are quite independent of a dark room, and saved the trouble of loading and unloading dark slides which cannot always be done at a convenient time.

See preceding and following pages.

AT LAST.

A Camera that will take 50 cut films of any make without any preparation.



Size only, 8 in. × 6 in. × 6⅜ in.

No Sheaths required. No Notching necessary. Will take Plates if no Films can be had. Will take Films and Plates mixed. It makes no difference. Mechanism can be examined in daylight.

Shutter ever set, with various speeds, time and instantaneous at will. Finders—The most brilliant.

See the "Challenge" Film Magazine Camera before deciding on any; its simplicity will astonish you.

Price, ¼-plate size, with first-class view lens, ...	**£5**	**5**	**0**
,, ,, R. R. lens, ...	**6**	**6**	**0**
,, ,, Taylor & Hobson lens, ...	**7**	**7**	**0**
,, ,, Goerz 6 in. lens.	**11**	**11**	**0**

See preceding and following pages.

LIZARS'

"LIGHTNING" PRINT WASHER (Protected).



Hypo eliminated in five minutes. No scratching or injury to Prints Invaluable to the Amateur and Professional. The Lightning Print Washer is absolutely the only perfect machine for this purpose in existence.

It will remove all traces of Hypo from the prints in *five minutes*, and in that time they are more thoroughly and perfectly washed than they would be after being two hours in any other washer at present in the market. The contaminated water is drawn off from the bottom by means of a Syphon. Each print is attached by the rebate or white edge by a brass spring to a revolving drum or cylinder, the axle of which rests in two grooved fittings. The rubber tubing is fixed in the usual manner to the water tap and the supply pipe; the latter which is perforated, extends the full length of the inside of the cylinder. The water is now turned on, and the cylinder, with prints attached, will at once begin to revolve to any required speed, and the surface of each print as it passes the perforated supply pipe is flushed with water from end to end. By this ingenious arrangement of fixing the prints separately, they cannot come in contact with each other, consequently no clogging takes place, and when washed they are absolutely free from scratches and bruises, which is a most common occurrence in all other forms of washers. The prints are quickly attached and detached from the cylinder, and the cylinder can be taken from or put into the washer in an instant. The washer can be used with a rack for washing plates.

PRICE, complete, with Washer and Cylinder capable of washing prints from quarter-plate size up to 24 1/1 plate size, 18s.



LIZARS'

'Range' Field Glasses.

The 'RANGE' Field and Marine Glasses are constructed on an entirely new principle, and supersede in power and definition all other forms of Binoculars.

Genuine Glasses bear my Name.

Have been supplied to nearly every Government in the World.

See preceding and following pages.

IMPORTANT ADVANTAGES.

GREAT MAGNIFYING POWER.—The magnifying power of the best ordinary Field Glass is four times, rarely exceeding, and generally below this estimate. The "RANGE" Glasses magnify six, eight, and eleven times.

FOCUSSING ARRANGEMENT.—The Focussing Arrangement is a novel one, and does away with the trouble of focussing each time the glass is used. When once focussed the instrument requires no further attention, and is ready for use at any time without readjustment. This great desideratum will be at once apparent to military men, as well as to sportsmen and tourists. They are exceedingly portable and light, and are in every respect of the best quality.

PRICES.

With best Solid Leather Sewed Case and Strap, Object Glasses, 1¾-in. in diameter.

		Height When Closed.	Height When Open.
To Magnify 6 times, ...	35/	3½ inches	5 inches.
Do., 8 ,, ...	50/	4½ ,, ...	6½ ,,
Do., 11 ,, ...	63/	5 ,, ...	6⅝ ,,
Do., 11 ,, ... Object Glasses, 2 in. in diameter, ...	100/	6 ,, ...	7⅛ ,,

If mounted in Aluminium instead of Brass, thus reducing the weight by one-half, 84/, 120/, 150/, and 200/ respectively. Postage abroad, 2/6 extra.

The "Range" Field Glasses have been taken in preference to all others for Military and Sporting purposes.

CHATHAM.—"Your "Range" Field Glass combines in a remarkable degree high power, clear definition, portability, and cheapness."—Major J. W. SAVAGE, R.E.

"Your "Range" Field Glass gives great satisfaction. Please send another the same."—Lieutenant-Colonel PYNE, London.

PORTLAND.—"The "Range" Field Glass, magnifying eleven times, you sent me is the most powerful pair I ever looked through. I tested them against a pair of Binocular Telescopes which cost seven guineas, and they magnified quite as much, and had much better definition."—H. RUSSELL.

"I tested your "Range" Field Glass with a Binocular Glass, made by a good London firm, and your glass was so superior that I tested it against a *Binocular Telescope*. In definition it was quite equal, and in magnification only a little inferior to the Binocular Telescope, which opened out to double the size."—F. R. B. WALTON, Shrewsbury.

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See preceding pages.

THE POCKET CHANGING BAG

And Focussing Cloth (Patent).

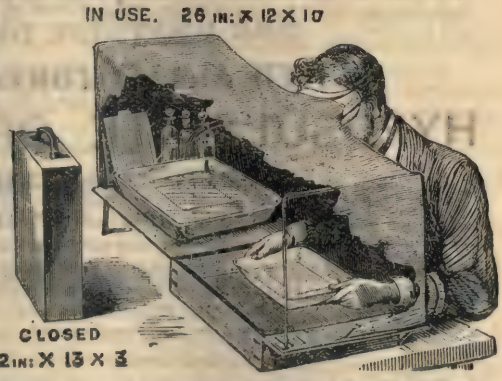


IS made of three thicknesses of black and red material which are perfectly lightproof, and is furnished with an opening for the eyes, to which is attached a band of soft leather, which adapts itself exactly to the face, and is retained in position by two elastic straps that fasten at the back of the head by means of a hook and eye In front is a window of three thicknesses of red material that admits a perfectly safe light, the amount of which can be regulated by fastening one or more of the hooks that keep up the blind, or by turning it to or from the light when in use. As no glass or other breakable material is used, the Bag cannot be injured by being tumbled up in the camera case or pocket, and the mouth and nose being outside the Bag the breathing is not interfered with.

Prices: **HALF-PLATE, or Small Hand Cameras, 7/6.**
WHOLE-PLATE, or Large Hand Cameras, 10/-.

THE TOURISTS' DEVELOPING TENT (Patent).

THIS is made in polished mahogany, and is provided with the same eye-piece that the Changing Bag has, and will be found the most convenient, compact and cheapest article of its kind. When open it is about 24 inches long by 10 wide, and 12 high, without the zinc sink, which is 2½ inches deep. When closed, it forms a box 13 inches square by 3½, in which the collapsible parts of the Tent occupy so little space that there is still room for 1 doz. half-plates, two developing dishes, two 6 oz. bottles, and several small articles. The sides of the Tent are composed of perfectly opaque material, and as the light can only enter by the red window, which is guarded by a blind, its amount can be regulated as desired.

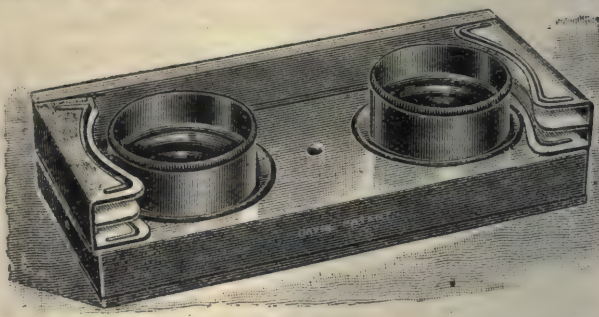


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DAY'S PORTABLE STEREOSCOPE.

Double Grooves. No Loose Parts.



Opens and closes as readily as a book.

REDUCED PRICE, POST FREE.

With Adjustable Achromatic Lenses ... **10/6**
With Adjustable Round Lenses **7/6**
With Large (1⅝ in.) Prismatic Lenses ... **6/-**

A few original make to be cleared out at **7/6, 5/-, and 3/6**

Size closed only 5⅛ by 2 5/16 by 1¼ inches.
Twice the size of the accompanying cut.

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HYPOSULPHITE OF SODA.

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In small Pure and Clear Crystals.

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Hyposulphite of Soda	99.80 per cent.
Moisture	.20 „
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Free from Sulphite, Sulphate, and no trace of Sulphocyanide of Ammonium.

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Important to Trade.

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NEW POPULAR PRICED

IRIS DIAPHRAGM SHUTTERS

With Pneumatic Retarder for Hand or Stand Cameras.

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For Isochromatic Work.

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A NEW DEAD BLACK,

Possessing Great Qualities of Toughness, Elasticity, and Solid Covering Power.

THIS BLACK, he feels confident, will prove most useful and convenient in all Trades where a **BLACK** is required, *and no Workshop should be without it.*

It **DRIES** quickly on all surfaces, Wood, Brass, Steel, Leather, &c., &c.

SAMPLE SENT ON RECEIPT OF STAMPS.

6d. BOTTLES, Post Free, **9d.** **1/-** BOTTLES, Post Free, **1/4.**

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DRIES IMMEDIATELY.

Used by Photographers, Opticians, and Manufacturers for the last 40 years; any comment on the quality of the article is unnecessary. It dries a beautiful Matt Black. Sold in Bottles, 6d. and 1/-; Half-pints, 2/-; Pints, 3/6.

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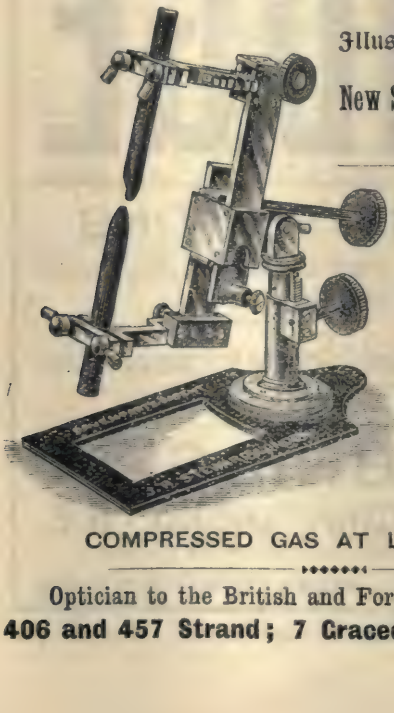
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The Portable Cinematographe. Certain and Noiseless 36 0 0

The New Cinematographe to fit in front of any good Optical Lantern. Small, Quiet, and Effectual ... 9 9 0



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Electric Arc-Lamp,

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The best for all Lantern Work & Projections.

COMPRESSED GAS AT LOWEST PRICES.

Optician to the British and Foreign Governments, &c.

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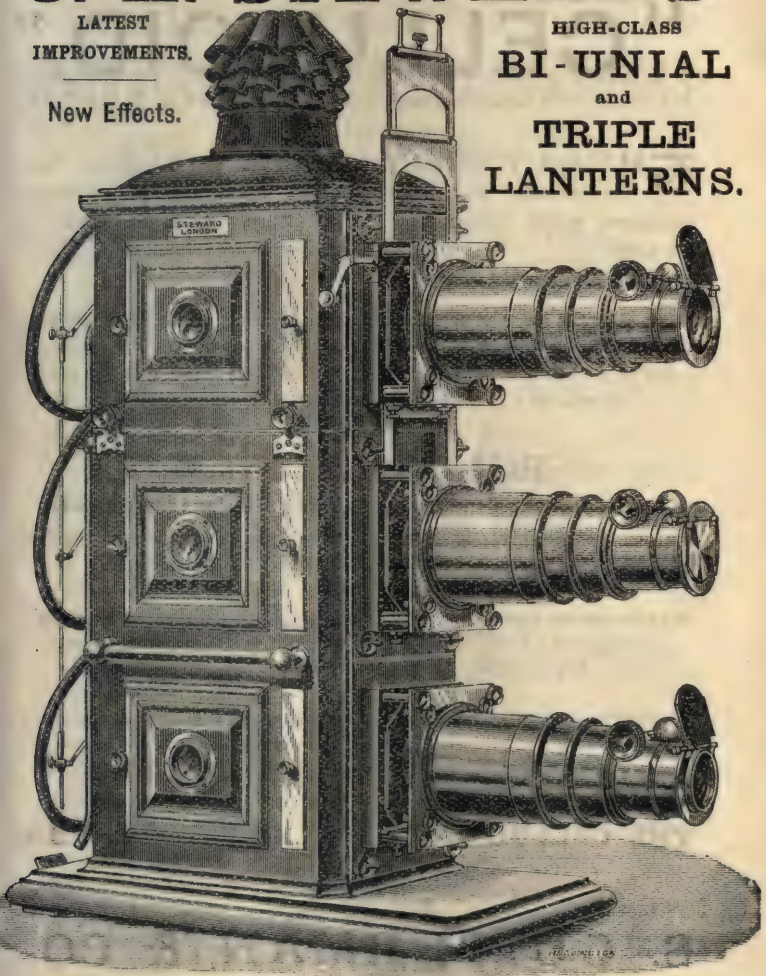
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TRIPLE
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ILLUSTRATED CATALOGUE GRATIS, POST FREE.

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See preceding page.

"CELLULOID."

(A Registered British Trade Mark.)

THE only Film made that will keep flat indefinitely and has no effect upon the photographic emulsion, either before or after exposure. Can be used for all sizes.

Sheets, 20 × 50, **3/9** per sheet. Thickness, $\frac{1}{100}$ in.

Extra thin for reversed negatives, also for covering prints by squeegeeing them into contact with it, and mounting with the film adhering to the face of the print, forming a perfect protection and covering to the print.

Sheets, 20 × 50 inches, **3/-** per sheet. Thickness, $\frac{5}{1000}$ in.

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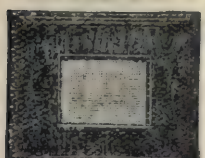
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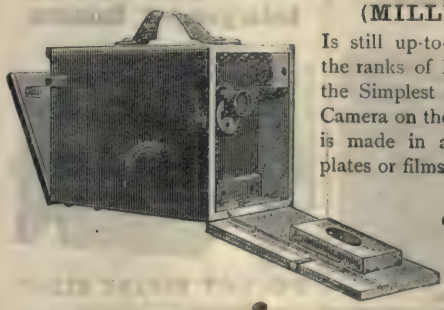
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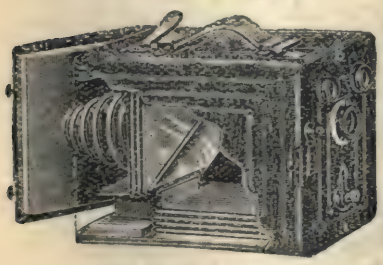
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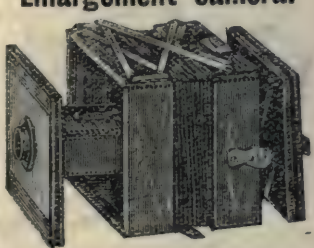
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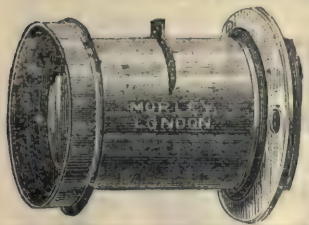
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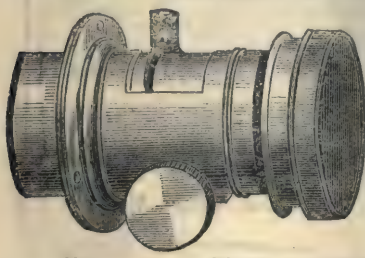
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7½ × 5	6½ × 4½	8 ,,	3 0 0	3 12 6	1 15 0	2 5 0	1 1 0	1 7 0
8½ × 6½	7½ × 5	11 ,,	4 0 0	4 18 0	2 10 0	3 5 0	1 10 0	1 18 0
10 × 8	8½ × 6½	13½ ,,	5 0 0	5 5 0	3 10 0	4 5 0	2 8 0	2 16 0
12 × 10	10 × 8	17½ ,,	6 0 0	6 5 0	4 15 0	5 15 0	3 6 0	3 15 0
15 × 12	12 × 10	21 ,,	7 5 0	8 10 0	6 0 0	7 10 0	4 10 0	5 0 0
18 × 16	15 × 12	26 ,,	9 15 0	12 15 0				

MORLEY & COOPER'S FINE QUALITY PORTRAIT LENSES.

Working aperture *f*/4. Waterhouse Diaphragms.



WE can confidently recommend these Lenses to our professional customers, more particularly the three-quarter size, for best cabinets and large heads. For fine definition and depth of focus they are all that can be desired, and compare well with the most expensive Lenses. The half-plate size is adapted for rooms of more moderate length. Fine cabinet specimens of studio work may be seen from negatives by these Lenses.

Size.	Diameter.	Back Focus.	Distance.	Price.
C.-de-V. or ¼ plate	1⅛ in	4⅛ in.	14 feet	£1 10 0
Cabinet or ¼ plate	2⅛ in.	6¼ in.	15 feet	3 0 0
¼. Cabinet, or 7½ × 5 plate ...	2⅛ in.	7⅛ in.	16 feet	4 10 0
Whole plate	3 5/16 in.	9⅞ in.	19 feet	5 15 0

(Promenade 14 feet.)

MORLEY & COOPER'S EXTRA RAPID CABINET.

2B Cabinet	2 1/16 in.	6 in.	15 feet	£6 15 0
3B Cabinet	2 5/16 in.	7⅛ in.	16 feet	9 5 0

Working aperture *f*/3.

NOTE.—The above Prices are subject to 10 per cent. Discount for Cash with Order.

MORLEY & COOPER, 70 UPPER STREET, N.

[*See following page.*

MORLEY & COOPER'S
New & Second Hand Lenses & Cameras

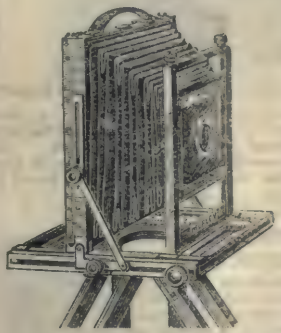
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MORLEY'S Rectilinear, Cabinet, & Long-focus View Lenses.

GOOD INSTRUMENTS PURCHASED OR EXCHANGED.

'THE M.C.' 'THE SIMPLEX.' 'THE STAR.' 'THE FAIRY.'

Are acknowledged to be Four of the **Cheapest,** the **Best Made,** and the **Most Reliable** Cameras ever offered to the Public.



The 'M. C.' CAMERA,

With three Double Slides, Half-plate, £3 0 0, Whole-plate, £4 10 0, is the very best value we have ever offered, and is a well-made, reliable Instrument at a very moderate price.

The SIMPLEX.

THREE DOUBLE SLIDES.

Quarter-plate ...	£3	10	0	10×8 ...	£8	0	0
Half-plate	4	5	0	12×10...	10	15	0
Whole-plate ...	6	0	0	15×12...	16	0	0

The STAR.

Quarter-plate ...	£5	5	0	10×8 ...	£9	12	0
Half-plate	6	5	0	12×10...	12	12	0
Whole-plate ...	7	10	0	15×12...	16	15	0

The FAIRY.

Quarter plate ...	£6	10	0	10×8 ...	£11	10	0
Half-plate	7	10	0	12×10...	14	15	0
Whole-plate ...	9	0	0	15×12...	18	10	0

All the above have Forward Movements for Wide-Angle Lenses.

The above prices are subject to **10 per cent. discount** for cash with order.



MORLEY & COOPER'S No. 1 'GEM.'

Is one of the simplest Hand-Cameras yet introduced. Dimensions, 8¾×6¾×4 inches.

It holds 12 quarter-plates in metal sheaths, changed by lever movement. It has a high-class achromatic single lens, rotating diaphragms, 2 view finders, automatic exposure register, an ever-set shutter, arranged for time and instantaneous exposures.

Price £2 2 0. Leather case, extra, 8s. 6d.
Cheaper patterns from 21s.

No. 2 GEM.

Is similar to No. 1 in general construction, but fitted with rapid rectilinear lens, Iris diaphragm and focussing adjustment.

Price £4 15 0 and £3 17 6.

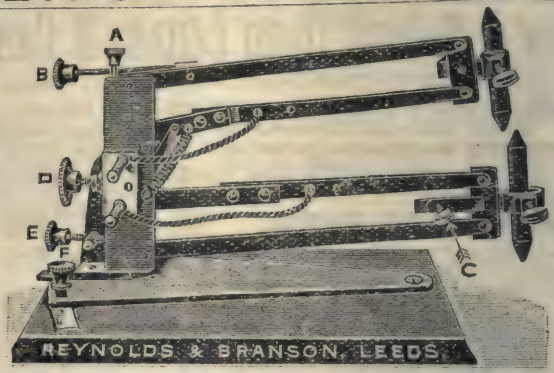
SPECIAL CYCLIST GEM, £4 10 0.

ILLUSTRATED CATALOGUE, TWO STAMPS.

[*See preceding page.*

REYNOLDS & BRANSON.

New 'Phœnix' Focus-keeping Arc Lamp.



For Optical Lantern with Parallel Motion. (Patent.) Fig. 1.

This Lamp is specially suitable for Optical Lanterns and Stage Lights.

A Striking Gear. B Adjustment for altering inclination of Carbon. C Horizontal Adjustment for Carbon. D Milled Head Screw for altering distance of Carbons. E Vertical Adjustment of Radiant. F Horizontal Adjustment of Radiant. The Lamp is hand-fed at D, and the parallel movement retains the Carbons in their respective positions throughout the whole time they are burning, and hence no adjustment is necessary after first striking the arc. Price £3 3s.



Fig. 2.

THE 'PHŒNIX' DARK-ROOM LAMP

is a boon to all Photographers who have gas at their disposal. The point of novelty is a special tap which enables the operator to obtain instantly either an actinic or non-actinic light. By turning the tap to A, white light is obtained; at C, non-actinic light; while at B both jets are turned down to non-luminous lights.

Price 15/-; postage, 1/-



Fig. 3.

PORTABLE HYDROKINONE DEVELOPER,

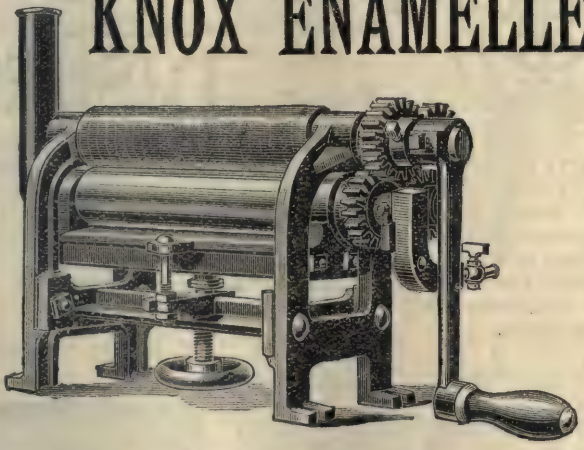
very suitable for travellers and for general use. Keeps indefinitely. In two tubes, A and B. Fig. 3 actual Pint size.

Price—½-Pt. 6d.	Pint, 8d.	Quart, 1/-	2-Quart, 1/6
Postage „ 1½d.	„ 2d.	„ 2d.	„ 3d.

14 COMMERCIAL STREET, LEEDS.

THE . .

KNOX ENAMELLER



IF you wish to produce work of the highest excellence, buy a "KNOX ENAMELLER," which is the first in the market. It has a quick-heating steel hollow Roll (polished and nickelled), improved Expansion Gearing, and Spring Pressure Adjustment, which give a perfect working action for various thicknesses of mounts. Very simple and effective gas-heating arrangement which can be lighted as easily as an ordinary gas jet.

ASK YOUR DEALER FOR IT.

Made with Rolls 10½, 15, 20, & 25 ins. long.

SOLE MAKERS:—

ADAM KNOX & SONS,

Engineers,

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Also Sole Makers of the celebrated

Knox Rolling Presses and Knox Bar Burnishers,

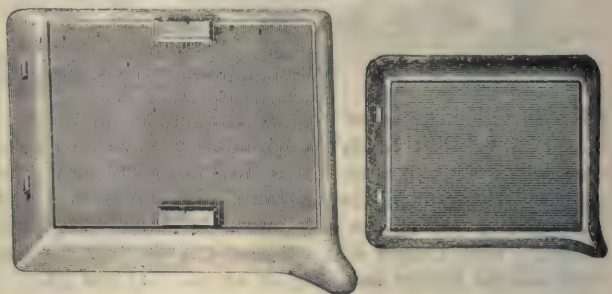
to be had from the principal Dealers.

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GRANITINE DISHES

AFTER seven years' experience it is acknowledged that these dishes are superior in every respect to the old ones, which were made of common earthenware, without any regard for the purpose for which they were required. The Granitine Dishes are made of a special semi-vitreous body and covered with a hard porcelain glaze, and may be used for all photographic chemicals indiscriminately, supplying a want long felt both by professionals and amateurs.

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The Editor of 'THE BRITISH JOURNAL OF PHOTOGRAPHY stated, in a letter to the manufacturers, that he had put them to every conceivable test, which they have successfully withstood.

They have recently been improved by the addition of a 'RUSH FOOT,' as shown above, making them more dense in substance than before, and not so liable to adhere to any moisture on developing table.

They may now be had at same price as the common ones, of all respectable dealers, and wholesale only from the manufacturers,

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EASTWOOD, HANLEY.

Telegraphic Address: 'EASTWOOD, HANLEY.' — *Telephone:* NO. 12 HANLEY.

London Show Rooms:—23 HOLBORN VIADUCT.

[*See following page.*

TRADE MARK.
GRANITINE.



REGISTERED No. 261705.

. . . THE IMPROVED . . .

Rational Plate Washer

IN submitting the Improved Registered Plate Washer, we feel confident we are supplying a want long felt by all classes of Photographers. The principle we have applied of causing the water to enter through the perforations directly between each plate, and syphoning out from the bottom of the Washer, ensures the complete washing of each plate, whether the Washer happens to be quite, or only partially filled with plates. The air-vent at the top of the Syphon is also a great advantage, enabling the operator at any time to turn off the supply of water, and leave the plates still covered with water, as the Syphon-flow will only act when the water reaches up to the air-vent; thus, by simply turning on the supply of water again, the Syphon is set in action at once.

By removing the Cork, when the washing of the plates is complete, the plates drain themselves ready for drying, and as these Washers are on the market at about half-price of our previous washer, no doubt an increased demand will ensue.

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LANTERN PLATE. HALF-PLATE.
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[*See preceding page.*

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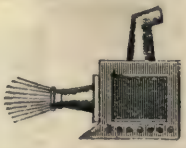
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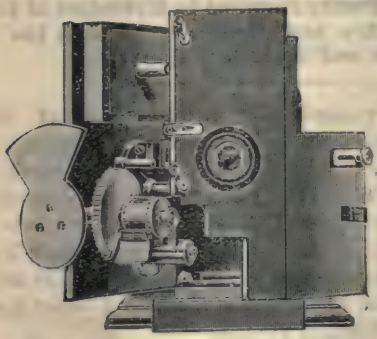
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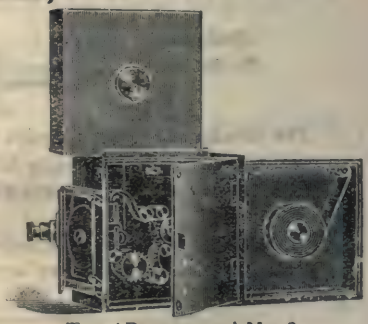
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has revolutionized Film Photography.

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FOLDING POCKET KODAK.

For illustrations of these cameras see opposite page, and for further details, see pages 990 to 1017.

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A complete Camera on a small scale **Price,** loaded with 12 exposures of film,

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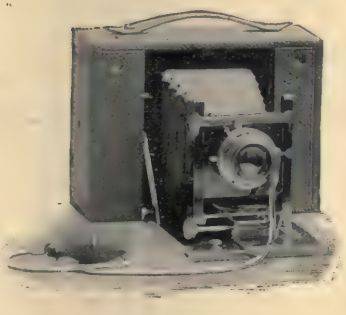
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A flexible transparent material coated with an extremely rapid emulsion. It is developed just as easily as a dry plate, and yields images with beautiful gradations. Extremely portable and convenient for storing. Supplied in patent spools to fit the Eastman Kodaks and the Eastman-Walker Roll Holders, also in light-proof cartridges which may be inserted in the camera in daylight.

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,, 3 ,,	Regular,	4¼ ,, 24 ,, ...	4	0
,, 3 ,,	,,	4¼ ,, 48 ,, ...	8	0
,, 3 ,,	,,	4¼ ,, 60 ,, ...	10	6
,, 3 ,,	,,	4¼ ,, 100 ,, ...	17	6
,, 3 ,,	Junior	3¼ ,, 60 ,, ...	10	6
,, 3 ,,	,,	3¼ ,, 48 ,, ...	8	0
,, 3 ,,	,,	3¼ ,, 24 ,, ...	4	0
,, 4 ,,	Regular,	5 ,, 24 ,, ...	6	6
,, 4 ,,	,,	5 ,, 48 ,, ...	13	0
,, 4 ,,	,,	5 ,, 100 ,, ...	26	0
,, 4 ,,	Junior	4 ,, 48 ,, ...	13	0
,, 4 ,,	,,	4 ,, 24 ,, ...	6	6
,, 4 ,,	Folding	4 ,, 48 ,, ...	13	0
,, 5 ,,	,,	5 ,, 32 ,, ..	15	6
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4¾ ,, ,,	4¾ × 6¾	,,	... ...		9	6
5 ,, ,,	5 × 8	,,	(or 25-5 × 7½)		13	0
6½ ,, ,,	6½ × 8½	,,	... ...		16	6
8 ,, ,,	8 × 10	,,	... ...		25	0

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$5 \times 7\frac{1}{2}$,, ... ,, 13 ,, ,,			1/-
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8×10 ,, ... ,, 6 ,, ,,			1/-
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$8\frac{1}{2} \times 6\frac{1}{2}$	2 6	$8\frac{1}{2} \times 6\frac{1}{2}$	1 11
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$4 \times 5\frac{1}{2}$	1 4	8×10	4 6
$4 \times 5\frac{3}{4}$	1 6	10×12	6 3
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$4\frac{1}{4} \times 3\frac{1}{4}$	3 0	... 2 6	3 6
5 × 4	3 6	... 3 0	4 0
7 × 5	4 0	... 4 6	6 0
$8\frac{1}{2} \times 6\frac{1}{2}$	8 6	... 8 0	10 6
"A" Ordinary ...	2 0	... 1 9	2 6
"A" Daylight ...	2 0	... 1 9	2 0
"B" Ordinary ...	3 0	... 2 6	3 0
"B" Daylight ...	3 0	... 3 0	4 0
"C" Ordinary ...	3 6	... 3 0	3 6
"C" Daylight ...	3 6	... 3 0	4 0
Pocket Kodak ...	1 6	... 1 6	2 0
No. 2 Bull's-Eye, Bullet	3 6	... 2 6	3 6
No. 4 ,, ,,	3 6	... 3 0	4 0
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Very light and compact, specially adapted to the cyclists use.

No. 4 Cartridge Kodak, for pictures 5 × 4 inches, on film and glass plates **£5 5 0**

No. 2 Bull's-Eye Kodak, for film pictures $3\frac{1}{2} \times 3\frac{1}{2}$ inches **1 13 0**

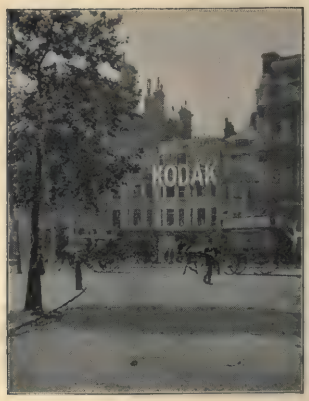
No. 2 Bullet Kodak, for pictures $3\frac{1}{2} \times 3\frac{1}{2}$ inches on film, and $3\frac{1}{4} \times 3\frac{1}{4}$ inches on plates **2 2 0**

Pocket Kodak, for pictures 2 × $1\frac{1}{2}$ inches on film and glass plates **1 1 0**

CARRYING CASES.—Specially adapted for ready attachment to the Cycle. Made of wood; covered with fine grain leather. Price, including pair of thumb-screw clamps, **10/6**

For prices of Tripods and other details see pages 990 to 1017.

KODAK PRICE LIST.



SEE
ALSO
PAGES 990 to 1017
OF
THIS
ALMANAC.

FACTORIES { 157, Whitfield Street.
19 & 20, Grafton Mews, W.

DAVID ALLAN

TRADE MARK

Registered.

Telegrams:
'Prospicience'
London.

157, WHITFIELD ST., LONDON, W.

Patentees by Royal Letters Patent.

MANUFACTURER OF

Photographic Requisites.

IN METAL AND WOOD.

STANDARD PHOTOGRAPHIC SPECIALITIES.
JAPANNER AND BRASS FINISHER TO THE TRADE.
PRESS TOOL MAKER, Etc.

NEW CATALOGUE—PRICE ONE SHILLING (returnable with first order for 10/-), contains over 200 Illustrations of Standard Photo Specialities, all of which are actually made by me- the following are a few:—

Backgrounds
Cameras
Dark Rooms
Dishes
Drying Boxes
Enlarging Lanterns
Fixing Tanks
Focussing Cloths
Hand Cameras
Isochromatic Screens
Lamps
Lantern Screens
Magic Lanterns
Plate and Paper Boxes
Printing Frames
Pressure Frames
Racks
Re-Touching Desks
Screen Supports
Sinks
Swing Taps
Tanks and Racks
Tripods
Washers, &c., &c.

Gravity Washing Tanks.

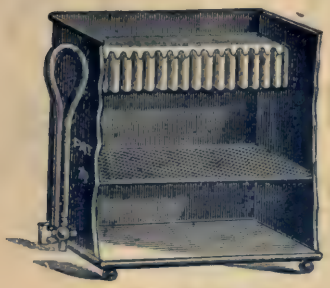


FIG. 84 (No. 4).

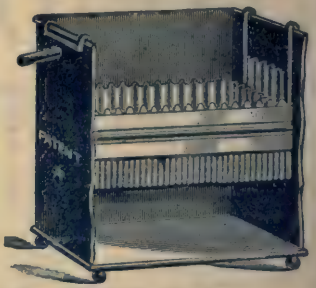


FIG. 85 (No. 5).

These Tanks are made on a scientific principle which has proved correct in practical use, *viz* :—given a sufficient volume of water beneath the plate the hypo **must** be precipitated and absorbed without a running stream of water They are fitted with syphon, overflow or tap to empty (as illustrated) It has been amply demonstrated that two or three changes of water each standing for an hour **without attention or running water** will completely eliminate hypo.

MADE IN THE FOLLOWING SIZES & FINISH.

No. 1 (Fig. 81). ENAMELLED.

TWO SIZES—24 GROOVES..

A.—$\frac{1}{4}$ to $\frac{1}{4}$ Plate ... ... B—$\frac{1}{2}$ to 12 × 10
14/3 21/-

Nos. 2 and 3 (Figs. 82 and 83). Either Pattern Enamelled

FIVE SIZES—24 GROOVES.

A	B	C	D	E
$\frac{1}{4}$	$\frac{1}{4}$ to $\frac{1}{2}$	$\frac{1}{4}$ to $\frac{1}{1}$	$\frac{1}{2}$ to 12 × 10	$\frac{1}{1}$ to 15 × 12
9/9	12/9	13/6	18/-	22/6

Nos. 4 and 5. (Figs. 84 and 85). Either Pattern.

PLAIN ZINC.

THREE SIZES—24 GROOVES ONLY.

A—$\frac{1}{4}$ to $\frac{1}{2}$ Plate. B—$\frac{1}{4}$ to $\frac{1}{1}$ Plate. C—$\frac{1}{2}$ to 12 × 10 Plate
9/9 12/9 16/6

DAVID ALLAN LONDON, W. TRADE MARK REGISTERED.

ANY PATTERN MADE TO SUIT SPECIAL REQUIREMENTS.

New Registered Film Tank & Rack



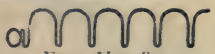
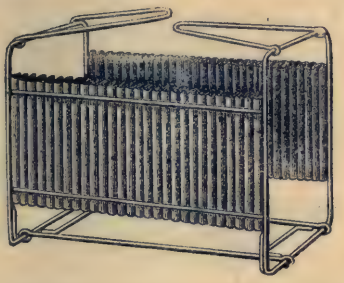


FIG. NO. 9C.

The Shape of this Groove is Registered—No. 304909.



Tank fitted with Syphon.

Takes 24 ¼-pl. Films. Size of Rack when folded 5 × 3½ × ¾

PRICE FOR TANK AND RACK **5/3** EACH NETT.

New Registered Drying Box

No. 277,397 and 283,011.

PERFECTION IN NEGATIVES.

ABSOLUTELY NO SPECS OR DUST.

Positively the Finest system of Drying Negatives QUITE free from dust in from 1 hour

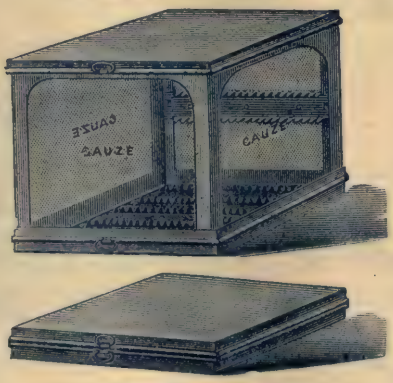


FIG 105..

Beautifully Enamelled.

Folds Flat, and contents pack in Box as shewn closed.

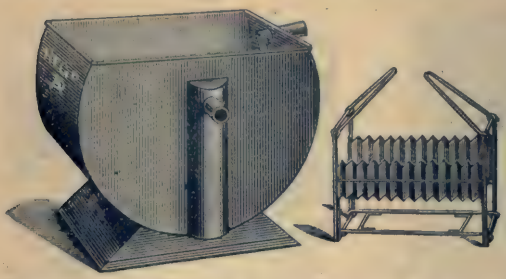
SHOULD LAST A LIFE-TIME.

24 Grooves

No. 1	For Lantern Plates and ¼ Plates ...	8/6 each
,, 2	5 × 4 and ½ Plates	11/6 ,,
,, 3	½ Plate and ¼ Plate	16/- ,,
,, 4	½, ¼. 10 × 8, 12 × 10, 15 × 12	21/- ,,

Dozens of Testimonials received,

The Champion Print and Plate Washer



This is the original Washer of this form, all others being in imitation.

FIG. 7A.

Gives Rotary Motion to the Prints in freeing them from Hypo.

DAVID ALLAN LONDON, W. TRADE MARK REGISTERED.

Enamelled White Inside.

Racks for Plates supplied at extra cost, which converts this Apparatus into a perfect Washer for Prints and Plates.

MADE IN FOLLOWING SIZES.

No.	0000 special for ¼-plate	...	3/6	with racks	4/6
,,	000 washes plates or prints to ¼ pl.		6/6	,,	7/9
,,	00 ,, ,, ,, ½ ,,		8/6	,,	10/9
,,	0 ,, ,, ,, 1 ,,		10/6	,,	12/3
,,	1 ,, ,, 10 × 8 ,,		18/-	,	20/3
,,	2 ,, ,, 12 × 10 ,,		27/9	,,	30/-
,,	3 ,, ,, 15 × 12 ,,		37/6	,,	42/-

Washable Lantern Screens

WHITE CALICO. ONE QUALITY ONLY—THE BEST

EYELETTED READY FOR USE.

The Screens are made to be stretched tight to sizes given.

5	feet square	...	3/9 each	12	feet square	...	19/1 each
6	,, ,,	...	5/3 ,,	14	,, ,,	...	23/3 ,,
7	,, ,,	...	6/9 ,,	15	,, ,,	...	24/9 ,,
8	,, ,,	...	8/10 ,,	16	,, ,,	...	27/9 ,,
9	,, ,,	...	9/4 ,,	18	,, ,,	..	31/6 ,,
10	,, ,,	...	13/4 ,,	21	,, ,,	...	46/- ,,

THE CHAMPION METAL DEVELOPING DISHES.



FIG. 71A.

Thoroughly Tested for Photographic Purposes.

NOT BRITTLE. NEITHER CHIPS OR CRACKS.
BEAUTIFULLY HARD WITH SPECIAL ENAMEL.

SIZES AND PRICES EACH NETT.

To take	¼	5×4	½	8½×6½	10×8	12×10
	4d.	5½d.	6d.	10d.	1/2	1/9

15×12	20×16	24×19	
2/6	6/9	9/6	Special sizes to order

ASH PRINTING FRAME.

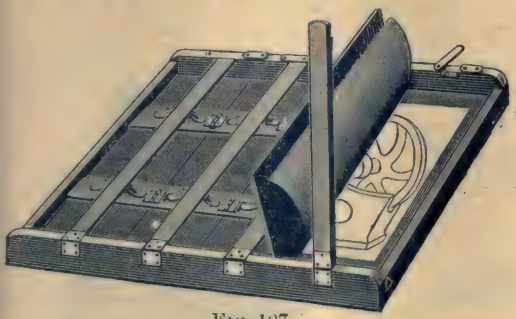


FIG 107.

ONE QUALITY ONLY
THE BEST.

Plate Glass and Felt Complete.

Cast Steel Hinges.

Brass Hinges to loose back.

Size of frames.	for	Price of frames.	Extra for portable stand as shown	*Strong zincdishes
23 × 16	Half Imperial	£1 6 3	£1 7 0	£0 4 3
28 × 21	... ...	1 17 6	1 12 6	0 9 0
32 × 23	Imperial...	2 3 6	1 16 9	0 10 6
42 × 29	Double Elephant	3 18 0	2 5 0	0 18 0
54 × 32	Antiquarian	5 12 6	2 12 6	1 8 6

* All sizes from 28 × 21 have G.M. Tap to Empty, with Handles.



FIG. 20B.

SLOPE FRONTED GAS LAMP.

Beautifully Japanned.
Black Outside.
Yellow Inside.

BYE-PASS FOR OUTSIDE LIGHT, EACH 3/- EXTRA

PRICE EACH NETT.	GAS.	OIL.
No. 1. With 10 × 8 Ruby Glass & Fabric Screen	5/3	6/3
„ 2. With 12 × 10 do. do.	10/-	11/6
„ 3. Extra large, Ruby Glass Fabric in Front and Side Windows	15/-	17/6

The Sloping "Whitfield."

REGISTERED No. 303,075.

FITTED WITH ADJUSTABLE SHADE.

BEAUTIFULLY JAPANNED.

Each 6/- Nett.

FOR GAS OR OIL.

Size of Glass $6\frac{3}{4}$ × $6\frac{1}{2}$.

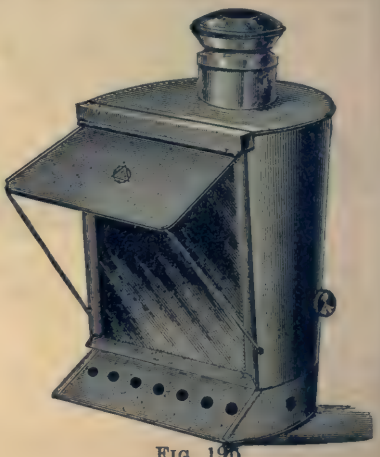


FIG. 19B

NEW SWING TAP.

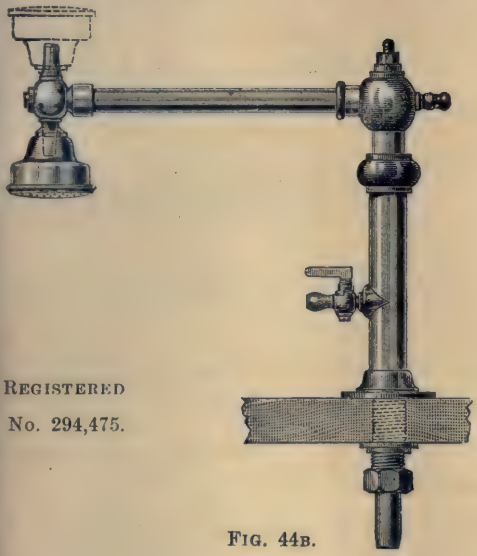


FIG. 44B.

Beautifully Finished.

Strong and Efficient.

REGISTERED No. 294,475.

DAVID ALLAN LONDON, W. TRADE MARK REGISTERED.

The only Swing Tap that can be used for spray or bottle filling and connecting to Washing Tanks at one and the same time

PRICE 12/9 EACH NETT.

David Allan has a large number of High-Class Novelties in course of preparation for next Season, and the same will be duly notified in the Photographic Press from time to time.

REGISTERED 

TRADE MARK.

PRELIMINARY ANNOUNCEMENT.

"Creel" Hand Camera

(PATENT)

TAKES 1 TO 48 CUT FILMS OF ANY MANUFACTURE.

No notching or backing cards required.

Full Size Finder.

R.R. Focussing Lens (Iris Diaphragm) of finest manufacture, specially made.

Roller Blind Shutter. Time and Instantaneous with speed indicator.

A single Film can be exposed and developed without wasting or disturbing the remainder,

The Films guaranteed to be as flat as an Engineer's surface plate, during exposure. There is no Manufacturer who can claim this without infringing our Patents.

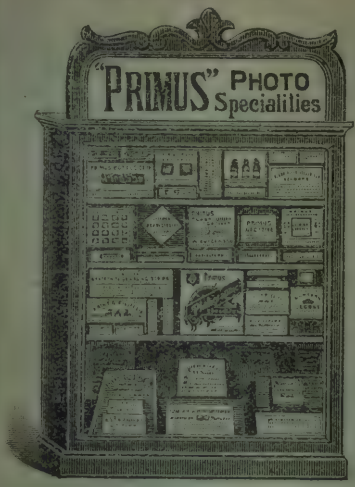
WILL UNDOUBTEDLY REVOLUTIONIZE FILM PHOTOGRAPHY. Is the finest achievement of modern improvements.

Made in two sizes ¼ plate and ¼ of ½ plate.

Further particulars on application to

DAVID ALLAN,
157, Whitfield Street, W.

23 ins. × 39 ins. × 8 ins.



'PRIMUS'

PHOTOGRAPHIC AND LANTERN SPECIALITIES.

WANTED.—All Dealers to know that one of these Handsome Showcases is supplied by the manufacturers free of charge with an order for a certain quantity of our Specialities. Not only do they form an attractive advertisement and ornament to the shop, but they ensure the proper storing of small goods, which can be found immediately they are asked for.

'Primus' Photographic Specialities include:—

Elevating Table.
Tripod Point.
Exposure Indicators.
Turntable and Tripod Top.
Film and Print Hangers.
Pocket Photo Cases.
Brush Rack.
Cloud Negatives.
Chemical Scoop.
Tinted Transparency Covers.
Flexible Vignettes.
Revolving Vignetter.
Indestructible Labels.
Analytical Labels.
Exposure Records.
Automatic Washing Tray.
Dish Holder & Plate Lifter.
Plate Dryer.
Metal Printing Frame.
Transparency Easel.
Stereoscopic Attachment.
Metal Plate Adapters.
Dark Slide Protectors.
Lens Protectors.
Bottle Rack. Bottle Clips.
Brilliant View Finders.
View Finder Covers.
Level View Finder.
Lightning Print Trimmers.
Photogravette.

'Primus' Lantern Specialities include:—

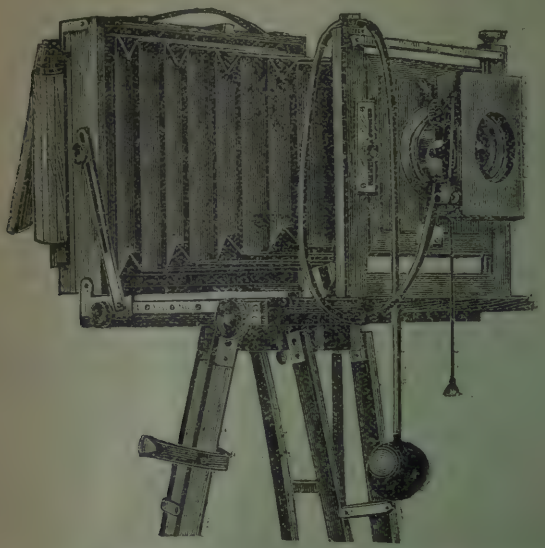
Revolving Lantern Tinter.
Lantern Tinters.
Condenser Case.
Incandescent Gas Support.
Burner Caps.
Self-centering Carrier.
Registering Screws.
Registering Slide Carriers.
Registering Slides.
Electric Signal.
Combination Cylinder Key.
Gas Fittings Outfit.
Fine Adjustment Tap.
Regulator Bags.
Lecturer's Lamps.
Limes in Glass.
Compact Slide Boxes.
Cylinder Support.
Tilting Screws.
Spot Binding Strips.
Silk Binding Strips.
Quadruple Binding Strips.
Stereoscopic Binding Strips.
Comb. Cover Glass & Binder.
Comb. Ditto & Silk Binder.
Masks, 'Drinkwater—Built.'
Masks, 'Adaptable.'
Masks, 'All sized.'
Slide Printing Frame.
Diagram Lantern Plates.
Notice Lantern Plates.
Cloud Cover Glasses.
Lantern Cloud Negatives.
Tinted Cover Glasses.
Systematic Exposure Board.
Lantern Glass Holder.
Lantern Slide Easel.
Reflecto cope.
Flexible Hymn Slides.

MANUFACTURERS AND PATENTEES—

W. BUTCHER & SON, Blackheath, London, S.E.

[*See following pages.*

PHOTOGRAPHIC OUTFITS.



50/= **HALF-PLATE OUTFIT.**—Including polished mahogany Camera, rack and pinion focussing, reversing back, &c., one Slide, single Achromatic Iris Lens, rebound Shutter, two-fold Stand.
Quarter-plate, **35/-**; Whole-plate, **75/-**.

70/= **HALF-PLATE OUTFIT.**—Includes polished mahogany Camera with every movement, including, for Wide-angle Lenses, one Double Dark Slide, Achromatic Rapid Rectilinear Lens, Thornton-Pickard Shutter, two-fold Ash Stand.
Extra Slides, **7/6** each. **Very handsome.**

84/= **HALF-PLATE OUTFIT.**—Includes polished mahogany Camera as illustrated above, with every required movement, best quality Double Dark Slide, best Leather Bellows, Achromatic Rapid Rectilinear Lens, Thornton-Pickard Shutter, three-fold polished Ash Tripod. Quarter-plate, **74/-**; Whole-plate, **126/-**.

Every Description of Camera and Apparatus supplied.

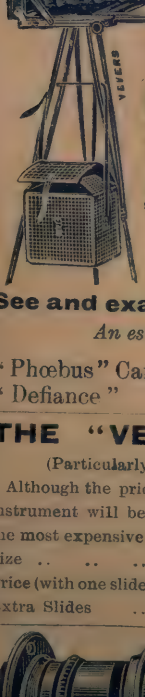
Write for Full Catalogue giving Every Particular.

W. BUTCHER & SON, Blackheath, London, S.E.

MANUFACTURERS OF CAMERAS, &c. TO BE HAD OF ALL DEALERS.

[*See preceding pages.*

VEVER'S SPECIALITIES



The ½-plate "Phœbus" Set.

(PATENT).

This is our "leading line for the coming season, and i offering such a really first-class outfit at 90/-, we have, as th Yankees express it, absolutely touched "rock bottom." This set mus not be confounded with the cheap rubbish advertised by the stores— everything included in this outfit is of THE BEST. The set comprises ½-plate "Phœbus" Camera, with rack and pinion, leather bellows, wid angle and other movements, and best quality book form slide; one of ou celebrated 7 by 5 rectilinear lenses, iris diaphragm; a really well-made as tripod, with leather covered brass triangle; an "Ever Ready" nickel shutte —a perfect little instrument for time or instantaneous exposures, wit pneumatic release; and a neat leather bound waterproof case, with sling strap, &c.

£4 10s. nett.

See and examine this set before deciding upon any other.

An estimate for any other size will be given by return of post.

"Phœbus" Camera & Slide only : ¼,42/6; ½,55/-; 1-1,75/-; 12 × 10,125/-.
"Defiance" .. .. ¼. 25/-; ½, 35/-; 1-1. 55/- nett.

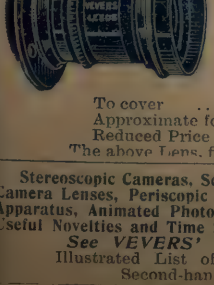
THE "VEVEO" CAMERA.

(Particularly suitable for hot climates).

Although the price is so extremely moderate, this instrument will be found equal in every respect to the most expensive London-made cameras.

Size	¼	½	1-1	10x8	12x10	15x12
Price (with one slide)	57/6	77 6	105/-	140/-	175/-	210/.
Extra Slides ..	8 6	12 6	17 6	20/-	27/6	35/-





VEVERS' RAPID RECTILINEAR LENSES.

REDUCED PRICES.

Although so remarkably low in price, these lenses will be found to be equal to the most expensive. We have hundreds of letters testifying to their superiority over lenses costing three times their price. Work at f-8, with Iris diaphragms, loose hood, focal length of lens and focal value of stops engraved on mount. Each lens will cover size larger than indicated. Four days approval.

To cover	5 x 4	7 x 5	9 x 7	10 x 8	12 x 10	15 x 12
Approximate focus	5½	7½	10	12	16	20 in.
Reduced Price ..	18/6	25/-	32/6	60/-	70/-	95/-

The above Lens, fitted with Waterhouse Stops can be supplied at same price.

Stereoscopic Cameras, Square Cameras, Folding Cameras, Hand Cameras; Single Lenses, Hand Camera Lenses, Periscopic Rectilinears, W. A. Rectilinears, etc.; Tripods, Shutters, Enlarging Apparatus, Animated Photograph Cameras and Projectors, Ruby Lamps, Washers, Hundreds of Useful Novelties and Time Savers.

See VEVERS' Illustrated Photographic Catalogue. Post Free 2d.

Illustrated List of Camera Fittings, Woodwork, Bellows, &c. 1d. Stamp.
Second-hand Apparatus, bought, sold or exchanged. List free.

Works:—**Lambert's Yard & Call Lane.** Repairs & Specials, good, prompt & reasonable.

C. C. VEVERS, 163, BRIGGATE, LEEDS.

Vevers' "Featherweight" Double Slides.

The Cheapest, Lightest, and only reliable low-priced Slide in the Market.

2/6

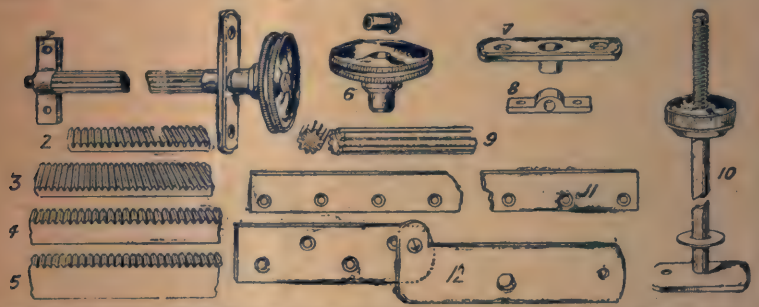


Size	½	½	1-1
Price, Solid Pattern, with Composite Shutters, each	2 6	4 -	6 -
Ditto, with Celluloid Shutters, "	3 3	5 6	8 6
Price, Book Form, with Celluloid Shutters each	4 -	7 -	11 6
Extra, with Shutters to draw completely out each	1 -	1 6	2 6

These slides are made of polished mahogany, with composite or celluloid shutters, they are absolutely safe, perfectly light-tight, easily filled, no trouble in use, and infinitely superior to metal slides. A ½-plate slide weighs but 3-oz., ½-plate about 5½-oz., and 1-1 plate 10-oz. They are sent out with the outside grooves (to fit camera back) *uncut*; any cabinet maker can fit them to the camera, or if reversing back, or a slide to fit same, is sent with order, we will fit any size at 6d. each, or 1s. the set of three.

CAMERA AND TRIPOD FITTINGS.

Being actual makers we are in a position to supply best quality Camera Brasswork Bellows, &c., at a lower rate than any other house in the kingdom. We shall at all times be pleased to quote for special patterns or sets in any quantities. The following is merely an abridged list. Price List of Fittings, &c., with 114 Illustrations, will be forwarded on receipt of 1d. stamp.



Rack and Pinion Sets. Rack Cut and Drilled ready for fixing. ½, 2 9; ½, 3 6; 1-1, 4 6.
Camera Screw and Baseboard Nut, 4d. each. Extra large, 8d. each.
Double Hinges, for Focussing Screen, Finished and Lacquered, 8d. to 1s. per pair.
Milled Screws with Plug Nuts, ¼in., 2d.; 9-16in, 2½d.; 5-8in. and ⅝in., 3d; 7-8in., 4d. each.
Milled Nuts for Extension Rods, &c. ½in., 9-16in., 2d.; ⅝in., 2½d.; ¾in., 3d.; ⅞in., 3½d. each.
T Bolts and Milled Nuts, 4d. each.
Side Swing Struts. Finished and Lacquered, ½, 10d.; ½, 1s.; 1-1, 1 3 per pair.
Side Hinge Sets (complete), ½-plate size, "Defiance" Pattern, 2/-; "Phœbus" 3 6; "Veveo" 4 6.
Slotted Plates for Baseboard. Finished and Lacquered, ½, 1/-; 1-1, 1/3.
Extension Rods for Fronts, with Nuts, Washers, and Feet. ½, 1/-; ½, 1 3; 1-1, 1/6 per pair.
Guide Strips for Extension Fronts. Finished and Lacquered, ½, 9d.; ½, 1/-; 1-1 1/3, "
Bridges for Strap Handles for carrying Camera, Finished and Lacquered, 3d. per pair.
Strap Handles for above. Black or Tan Leather, 2d. and 3d. each.
Hook Clips and Hinges for Reversing back, set of 4, Finished and Lacquered, 9d.
Dark Slide Hinges 1d. per pair. **Turn Pins,** screwed, 1d. per pair. **Hooks,** 4d. per doz.
Ivory Numbers, 1 to 24, 1d. each, 9d. per dozen.
Slide Clip Hinges, Unbent, 1d. per pair. Bent and Drilled, 2d. per pair.
Brass Triangles, Leather Covered, ½ and ½, 1 6; 1-1, 2/- each.
Mahogany Dark Slide Grooving, 5d. per foot. Cut to size and mitred, ½, 1/-; ½, 1 3; 1-1, 1/6: 10 x 8, 2 3; 12 x 10, 3/-; 15 x 12, 3/6.
Shutters for Dark Slides. Double or Multiplex hinges, ¼, 9d.; ½, 1/-; 1-1, 1/6 each.
Camera Woodwork in parts to any pattern. Estimates given.
All Woodwork got out ready for making ½-plate Long Focus Camera, 4 -.
Bellows. Best Leather, Double Extension, 1-4, 2/6; ½, 4/9, 1-1, 7/9.

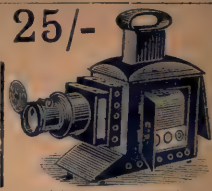
Repairs to Cameras and other Photographic Apparatus on the Shortest Notice.

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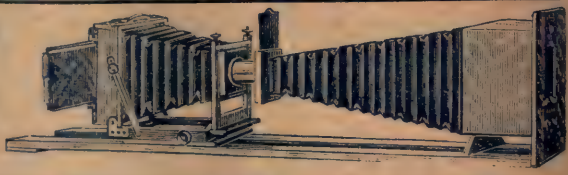
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12 × 10	1 6	3 3	1 10	2 3
15 × 12	2 0	4 6	2 6	3 0
18 × 15	2 3	—	3 0	4 2
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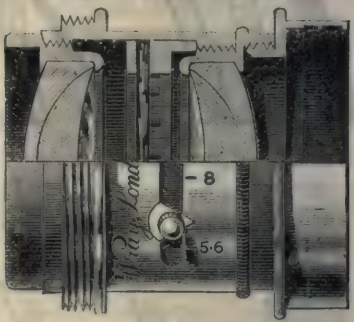
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IMPROVED IRIS DIAPHRAGM.

ENTIRELY CONTAINED WITHIN THE BODY OF THE SETTING WITH CLICK FOR EACH APERTURE.



The Illustration shows 5×4 R. R. Actual Size.

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Size...	4¼×3¼	5×4	6½×5	8×5	8¼×6½	10×8	12×10	15×12	18×16	22×18
Waterhouse Diaphragms ...	£2 5	£2 10	£3 10	£4 0	£4 10	£6 0	£8 0	£10 10	£14 0	£30 0
Iris Diaphragms...	3 0	3 5	4 5	4 15	5 5	6 15	9 0	11 15	15 10	32 0
Aluminium Settings extra	0 10	0 10	0 10	0 10	0 15	1 0	1 5	1 10	3 0	5 0

The full aperture of these Lenses is *f*/8, excepting the two first, which have double this aperture, *f*/5·65.

Prices—WIDE-ANGLE RECTILINEAR LENSES.

Approximate Angle included, 90 degrees. Largest aperture *f*/16.

Focus	3-in.	4-in.	5-in.	6-in.	7-in.	8-in.	9-in.	10-in.	12-in.	15-in.	18-in.	21-in
Price	**£2 10**	**£2 15**	**£2 17 6**	**£3**	**£3 15**	**£4 10**	**£5 5**	**£6**	**£7**	**£8**	**£10**	**£12**
Aluminium Settings extra	0 10	0 10	0 10 0	10/-	0 10	0 10	0 10	10/-	10/-	15/-	£1	£1 5

The sizes from 3 to 10 inches fit one flange. Up to and including 9 inches focus they are fitted with Revolving Stops. Beyond these sizes Waterhouse Stops are used; but the Iris Diaphragm, 15s. extra, is strongly recommended for all sizes above 7 inches, and the largest aperture is then *f*/11·3.

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Focus	Rotating or Waterhouse Stop	Iris Diaphragm.
3½-in....	£2 5 0	£3 0 0
4¼ ,, ...	2 5 0	3 0 0
5 ,, ...	2 5 0	3 0 0
5¼ ,, ...	2 5 0	3 0 0
6 ,, ...	2 10 0	3 5 0
7 ,, ...	3 0 0	3 15 0

Focussing Jacket, with rack and pinion, for above lenses, 15/- each.

Five per Cent. Discount for Cash with Order.

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3 ins.	3 × 3	3¼ × 4¼	5 × 4	3 15 0	4 5 0
4 ,,	3¼ × 3¼	5 × 4	7 × 5	4 0 0	4 10 0
4½ ,,	4¼ × 3¼	6½ × 5	7½ × 5	4 5 0	4 15 0
5 ,,	4¼ × 3¼	6½ × 4¾	8 × 5	4 5 0	4 15 0
5½ ,,	4¼ × 3¼	7 × 5	8½ × 6½	4 15 0	5 5 0
6 ,,	5 × 4	8 × 5	9 × 7	5 5 0	5 15 0
7 ,,	6½ × 4¾	8½ × 6½	10 × 8	6 5 0	6 15 0
8 ,,	7 × 5	10 × 8	12 × 10	7 15 0	8 5 0
10 ,,	8 × 5	11 × 9	12 × 10	10 0 0	11 0 0
12 ,,	9 × 7	11 × 9	15 × 12	13 0 0	14 5 0
14 ,,	10 × 8	12 × 10	18 × 16	16 10 0	18 0 0
16 ,,	12 × 10	15 × 12	20 × 16	20 0 0	22 0 0

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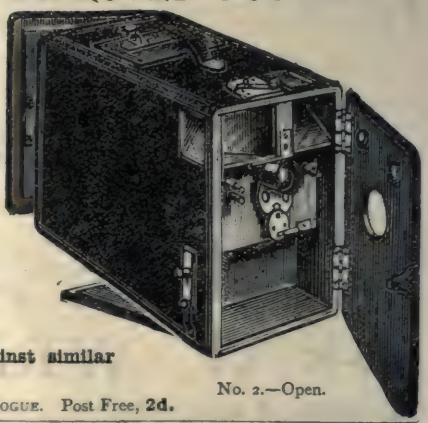
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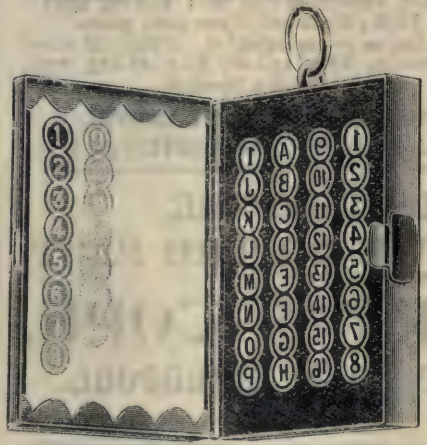
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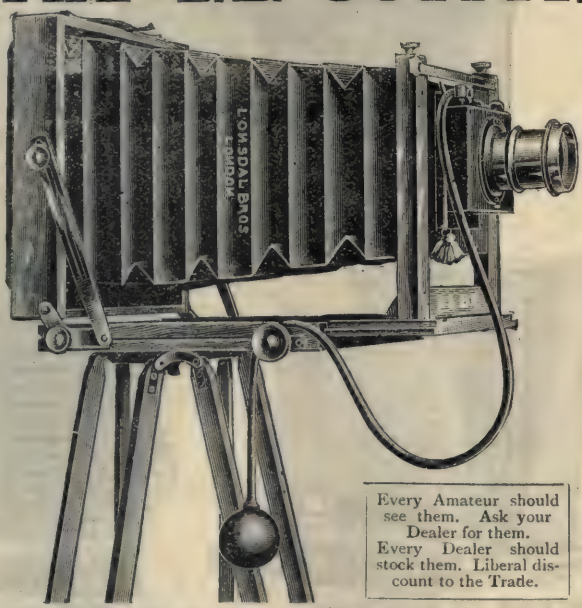
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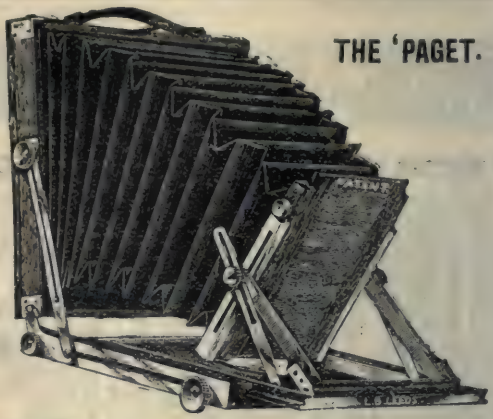
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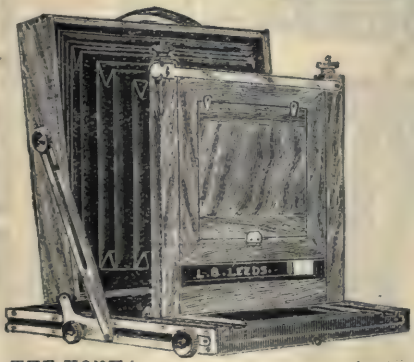
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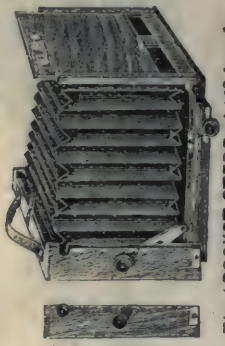
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THE 'PAGET.





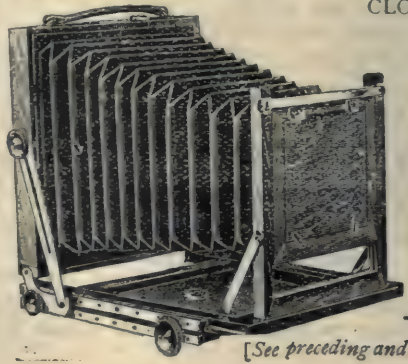
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The 'POCKET STEREO' (6½ by 3½).

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NEW



YORK.

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The 'YORK,' as illustrated, and 1 book-form slide	52/6	75/-	100/-	130/-	165/-
The 'NEW YORK' is very compact, 1 book-form slide	60/-	82/6	...	...	...
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Automatic Shutter Catches, 9d. per slide extra.

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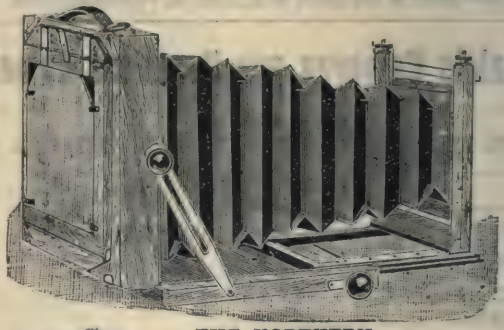


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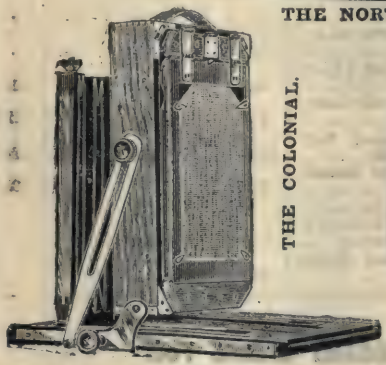
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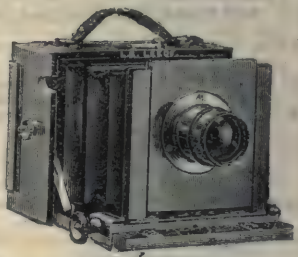
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THE NORTHERN.

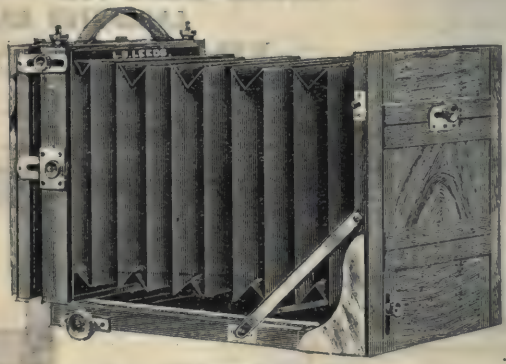


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Finishing brasswork, extra	2 3	2/9	3 3	3/9	4/-	4 6
Finishing woodwork ready for polishing, extra	5/9	7/-	10/9	15/9	2 /6	31 6
No. 2.—'YORK' CAMERA, 1 double slide, and brass fittings, unfinished	22/6	26/-	34,6	47 6	61/3	76 6
Finishing brasswork, extra	2/9	3/3	3/9	4/6	5,-	5/6
Finishing woodwork ready for polishing, extra	6,9	8/3	12/-	17/-	21/-	33,-
No. 3.—'NEW YORK' CAMERA, and 1 double slide, and brass fittings, unfinished	24/-	29 -	37 6	...	...	...
Finishing brasswork, extra	3/3	3 9	4/3	...	...	...
Finishing woodwork, extra	7/-	9,9	14/-	...	...	...
No. 4.—'COLONIAL' CAMERA, 1 double slide, and brass fittings, unfinished	27/-	34,6	45,6	58/-	74/-	90/6
Finishing brasswork, extra	3 6	4/-	4 6	5/-	5/9	6/6
Finishing woodwork, extra	8,6	12/6	16/6	20,6	26,6	35,-
No. 5.—'STANDARD' CAMERA, 1 slide, and brass fittings, unfinished	35/6	45/-	57/6	74/-	90/6	113/6
Finishing fittings, extra	3/6	3/9	4'-	4,6	4 9	5/-
Finishing woodwork, extra	14 6	17/-	29/-	25,-	29/-	36,6
Extra Slides, book-form, in parts, unfinished	3,3	4/-	5,6	7/-	8 6	11/-
Ditto, A quality, triple joints, rebated, unfinished	4/-	5/-	6/9	8,9	10/6	13,6
Extra Slides, finished, ready for polishing	5/6	8/3	12/6	..	...	...
Ditto, ditto, better quality, auto springs, &c.	7/-	9/9	14/-	18/9	24/6	30/6
Ditto, ditto, best A quality, ditto	9/6	12/9	17 6	22 9	28/6	36,6
Cloth Bellows for 'Northern,' 'York,' and 'Colonial' patterns	2/6	4/-	6 9	9 -	14/-	18'-
Leather Bellows, best quality	3/6	6 -	10,-	14 6	19/-	25 -
Ditto, ditto, for 'Standard'	3/9	7/-	11/6	16,6	21/-	27/3
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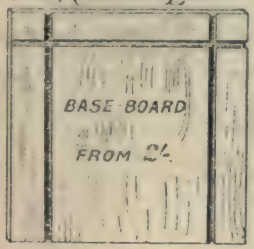
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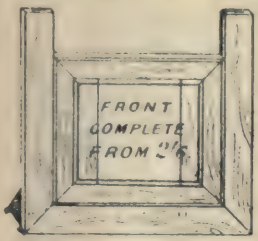
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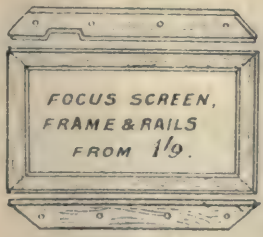
CAMERA COMPONENTS-SEASONED MAHOGANY

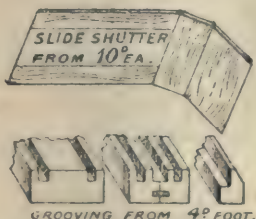
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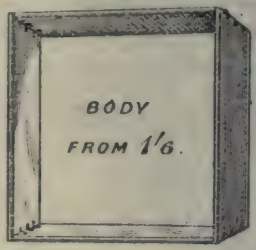




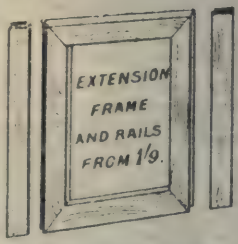


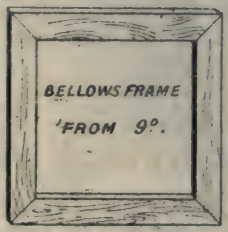


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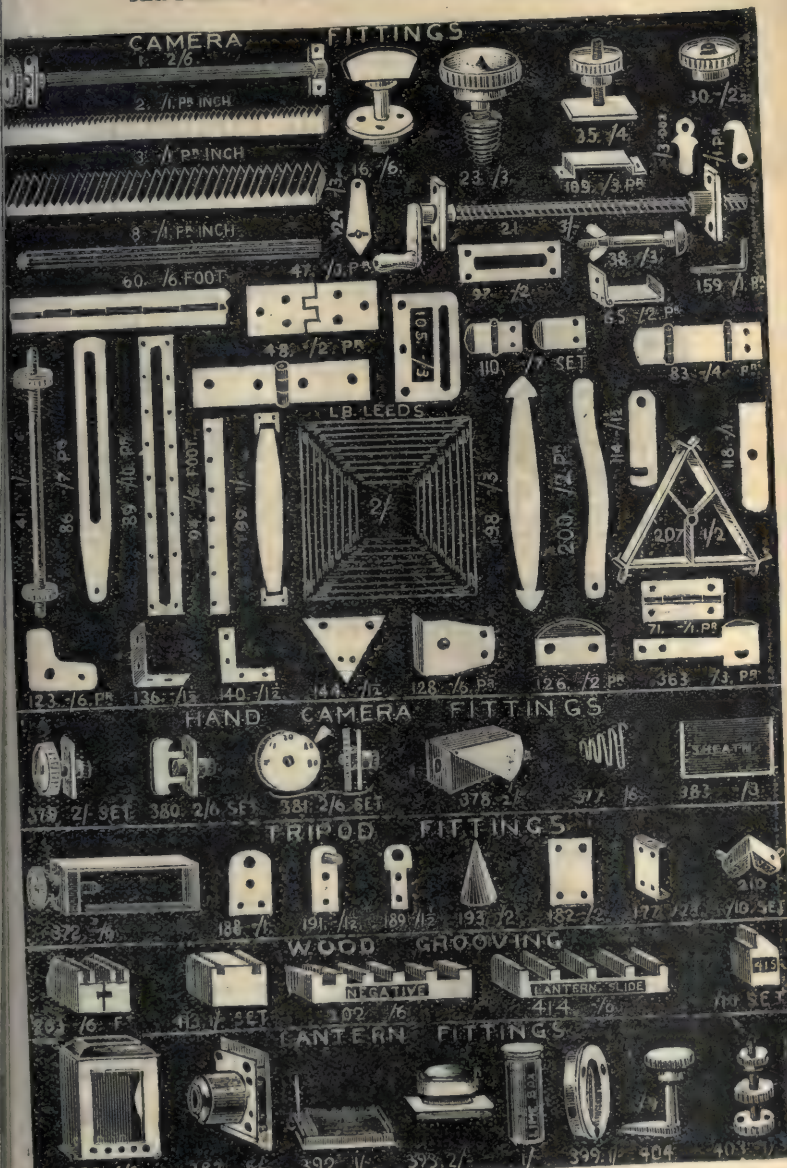


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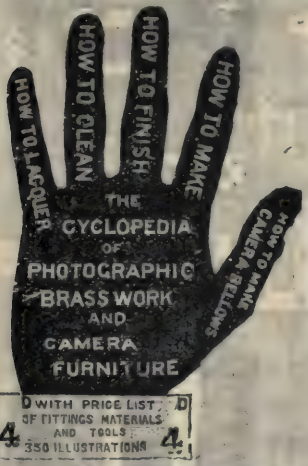
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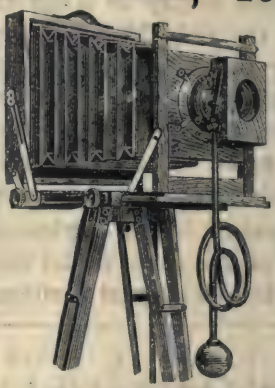
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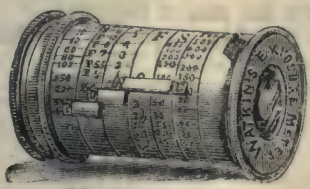
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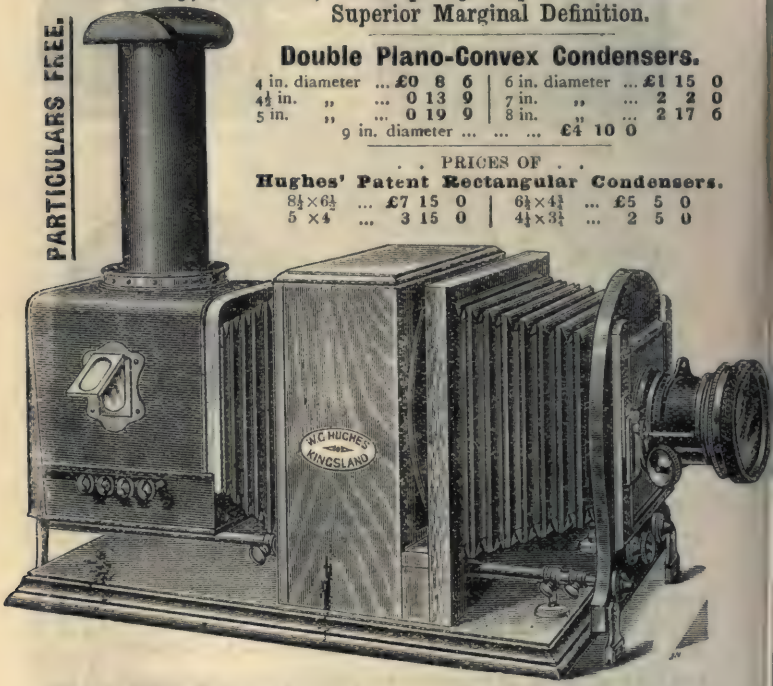
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ENLARGING LANTERN.

Rectangular Condensers the size of Negative.
Portability, Perfection, and Rapidity. Splendid Results.
Superior Marginal Definition.

PARTICULARS FREE.



Double Plano-Convex Condensers.

4 in. diameter	... £0 8 6	6 in. diameter	... £1 15 0
4½ in. ,,	... 0 13 9	7 in. ,,	... 2 2 0
5 in. ,,	... 0 19 9	8 in. ,,	... 2 17 6
9 in. diameter ...	... ...	£4 10 0	

. . PRICES OF . .

Hughes' Patent Rectangular Condensers.

8½×6½	... £7 15 0	6½×4¼	... £5 5 0
5 ×4	... 3 15 0	4¼×3¼	... 2 5 0

The only Perfect Enlarging Lantern for results. Fitted with Hughes' new pattern Pamphengos Lamp. Slide Holder arranged to suit parts of the larger sized Negatives. The body and front lens extend by means of solid brass tubes.

NO PHOTOGRAPHER SHOULD BE WITHOUT ONE.

Instead of Circular Condensers, Rectangular or Square, reduces the Lantern to half its size, and gives finer definition than any other. Perfect combustion and a pure white light. This Instrument is scientifically constructed, and not the common commercial article sold for cheapness. 8½×6½, **£21**; 6½×4¼, **£14 14s.**; 4¼×3¼, **£7 15s.**; 5×4, **£8 15s.** **Ten per Cent. Reduction off above Prices for Cash.**

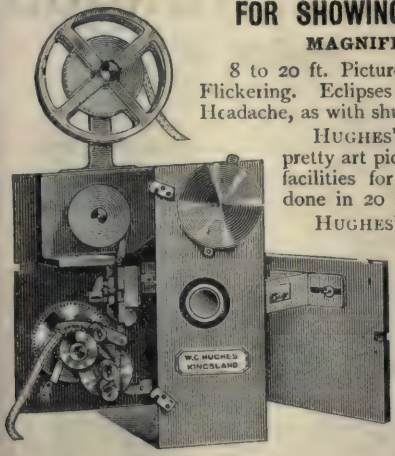
W. C. HUGHES, Brewster House, 82 Mortimer Rd., **Kingsland, London, N.**

[*See following pages.*

HUGHES' MOTO-PHOTOSCOPE

FOR SHOWING LIVING PICTURES.

MAGNIFICENT RESULTS.



8 to 20 ft. Pictures. No Shutter, therefore No Flickering. Eclipses all others. No Eyesache, no Headache, as with shutter machines.

HUGHES' MOTO-PHOTOSCOPE will show pretty art pictures alternately, and has great facilities for changing films—the winding done in 20 secs.

HUGHES' MOTO-PHOTOSCOPE is the most simple and most perfect piece of mechanism extant; magnificent engineer's work—without this perfection cannot be obtained. Prof. Malden, F.R.G.S., says: 'A great success. The machine works admirably, and brought down uproarious applause. The people, with one accord, say it is the best they have ever seen.' No. 1, price £35 10s.; No. 2, £24 10s. If without lantern—No. 1, £27; No. 2, £20. Illustrated particulars, 2d.

HUGHES' EXHIBITORS' MOTO-PHOTOSCOPE.

No. 3. Precisely the same in principal as Nos. 1 and 2. A portable, perfect instrument. Price £14 14s. Splendid series of films. The Queen's Jubilee, &c. Films from 30s. each.

Mr. Hughes has the Grandest Display of High-class Projecting Lanterns and Effects, &c., the World has ever seen.

The Docwra, the Grand, and the Miniature Malden Triples. Superb instruments, as supplied to Madame Patti, Colin Docwra, Esq., Professor Malden, Capt. Chas. Reed, R.N., the Maharajah of Mysore, Royal Polytechnic, &c. Unequalled results. Before purchasing, get Hughes' grandly illustrated Catalogue, 180 original engravings, price 6*d.*, postage 3*d.* Gives valuable information. Illustrated Pamphlets free. Price list of 60,000 Slides, 4*d.*, postage 2½*d.* Cheapest and Best Lantern Outfits in the World.

HUGHES' BIJOU LIVING-PICTURE CAMERA, best in the market.

Developing Apparatus for Films. Particulars free.

W. C. HUGHES (Specialist), Brewster House, 82 Mortimer Rd., Kingsland, **LONDON, N.**

[*See preceding and following pages.*

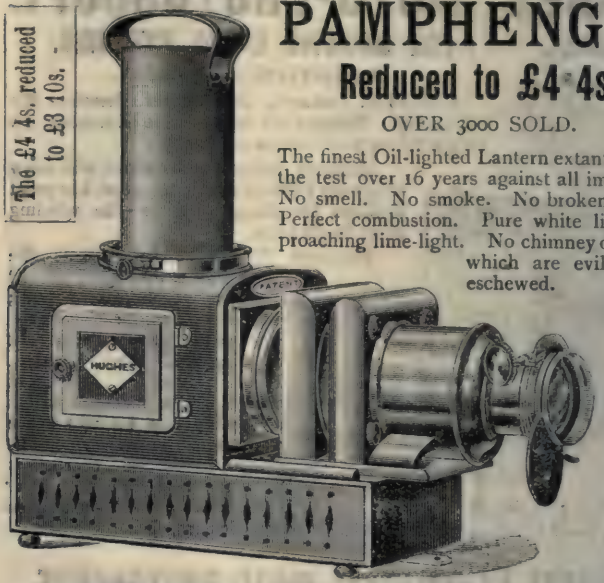
HUGHES' MARVELLOUS £6 6s.

PAMPHENGOS

Reduced to £4 4s.

OVER 3000 SOLD.

The £4 4s. reduced to £3 10s. -



The finest Oil-lighted Lantern extant. Stood the test over 16 years against all imitations. No smell. No smoke. No broken glasses. Perfect combustion. Pure white light, approaching lime-light. No chimney dampers, which are evils to be eschewed.

Hundreds of Testimonials

The PAMPHENGOS is scientifically constructed, therefore burns steadily without any trouble. It has 4 in. finest condenser, and front lenses not long-focus. These cause loss of light with oil, but we supply a 2⅜ diameter Lens for 18*s.* 6*d.* extra, or if desired in lieu of the other. We challenge comparison.

HUGHES' UNIVERSAL 4-WICK LANTERN,

With 4-inch Condensers, 18/6.

Marvellous value. Blow-through Jets, 8/6; mixed ditto, 12/-.

Plain Photographs, -/6 and 1/-; Coloured, 1/-, 1/6, and 3/6.

Hughes' Beart Jet, 2000-candle power.

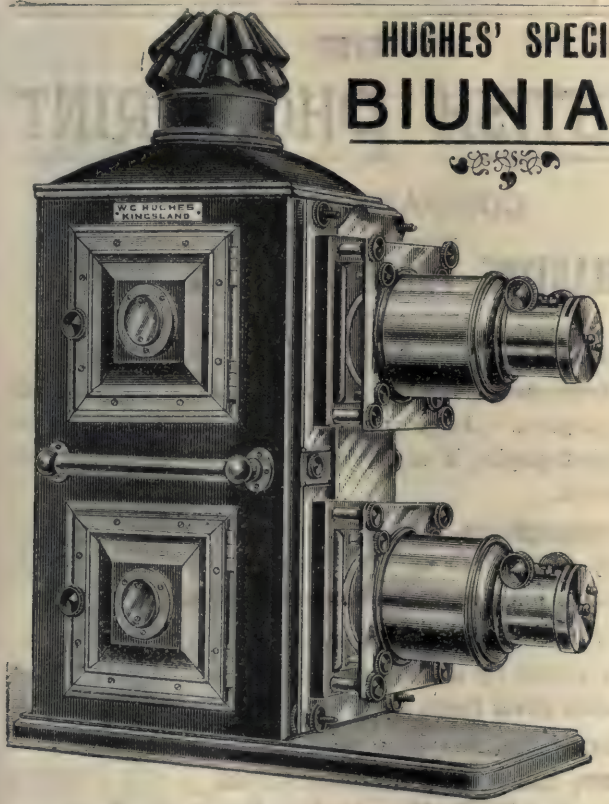
Send for GRANDLY ILLUSTRATED CATALOGUE. 180 choice original Engravings of the Finest Collection of Instruments in the world. Price 6*d.*, postage 3*d.* List of 60,000 slides. Queen's Jubilee, Nansen Lectures, Tales, Hymns, Scripture, &c., 4*d.*, postage 2½*d.*

BEFORE PURCHASING CONSULT

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HUGHES' SPECIAL BIUNIAL.



Price only £7 10s.

Mahogany Body, elegant solid Brass Fronts, Brass Handles, 4-inch first-class Condensers and Front Lenses. Brass Handles Ditto, with plain Mahogany Body, **£6 10s.** Blow-through Jets, **8/6**; Mixed Gas, **12/-**.
Plain Photographs, -/6 and 1/-; Coloured, 1/-, 1/6, to 3/6 each.

Mr. Hughes has the Grandest Display of High-class Projecting Lanterns and Effects, &c., the World has ever seen.

The Docwra, the Grand, and the Miniature Malden Triples. Superb instruments, as supplied to Madame Patti, Colin Docwra, Esq., Professor Malden, Capt. Chas. Reed, R.N., the Maharajah of Mysore, Royal Polytechnic, &c. Unequalled results. Before purchasing, get Hughes' Grandly Illustrated Catalogue, 180 original engravings, price **6d.**, postage **3d.** Gives valuable information. Illustrated Pamphlets, **2d.**; price list of 60,000 Slides, **4d.**, postage **2d.** Cheapest and Best in the World.

W. C. HUGHES, Specialist in Optical Projection,
BREWSTER HOUSE, 82 MORTIMER ROAD, KINGSLAND, LONDON, N.

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THE BRITISH PHOTOPRINT

COMPANY (Limited).

COLLOTYPE PRINTERS TO THE TRADE.

COLLOTYPE PRINTING especially recommends itself for **Advertising** and **Commercial** purposes. It gives the delicacy and detail of the finest photographs, is rapid in production, permanent, and inexpensive.

Photographers, Printers, and **Stationers** can considerably add to their returns by adopting the process, to all of whom we will give the best assistance and terms.

There is an unlimited field for this branch of business.

You should try it for the reproduction of **Local Views** in imitation Silver Prints and Platinotypes.

View Books.
Menu, Xmas, and Greeting Cards.
Magazine Illustrations, Letter Headings, &c.
Pictorial Post-cards (of which we are now publishing a series).

We possess the most modern Machinery and up-to-date Printing Works.

Telegrams.	Works.	Telephone.
'ARTILIZING, LONDON.'	TWICKENHAM.	387 HOLBORN.

17 FARRINGDON STREET, LONDON, E.C.

PHOTO SPECIALITIES.



THE TRINITY FOCUSSING HAND-CAMERA.

New & Improved Pattern.

As used by Royal Irish Academy.

Price - - - £5 5s.

No. 2 TRINITY HAND CAMERA

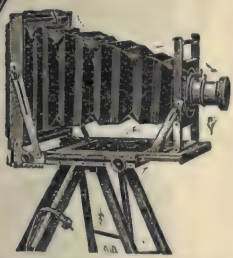
Carries 12 Plates, Time and Instantaneous Shutter, two Finders.

Price 42s.

Telegrams: 'DOBSON'S.'

Dobsons and Curtis Bros. Ltd

1898 Pattern.



The New ½ TRINITY Stand Camera Set.

Best quality Camera, fitted with all the most recent Improvements, three best Double Dark Slides, our best quality Rapid Rectilinear Lens, and three-fold Sliding Stand, forming a most desirable set at a low price. Owing to the demand for these sets, we have been enabled to largely reduce the price to **£5 10s.**

DOBSONS & CURTIS BROS., Ltd.

10 Suffolk Street, and

113 & 114 St. Stephen's Green, DUBLIN,

CONTRACTORS TO HER MAJESTY'S GOVERNMENT.

SALMON'S NEW PATENT
ADJUSTABLE VIGNETTER
For Portraiture and Landscapes.



SAVES TIME!

Immediately attached or detached to any Printing Frame, firmly clipped by Aluminium Slides.

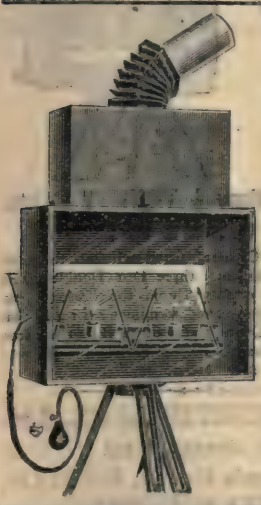
Adjustable in every direction.

Vignetting Card can be placed at various distances from Negative, and at an angle, or quickly changed.

PRICES.

Including Slides and 12 Cards (six with openings of various sizes, and six for cutting as desired):—
½-plate, 2s. 0d. ¼-plate, 2s. 6d.
Whole-plate, 3s. 6d.
With superior Printing Frame, and Slides attached:—
½-plate, 2s. 6d. ¼-plate, 3s. 3d.
Whole-plate, 4s. 9d.

OF ALL DEALERS.



SALMONS'
.. Patent ..
Portable Magnesium Ribbon Lighting Apparatus
For PORTRAITURE.

A powerful Actinic Light of Several Seconds' [illegible] duration, producing a Photograph.

EQUAL TO DAYLIGHT. NO DANGER.

No Smoke or Smell, no Noise or Heat. Light Telescopic Chimney inclined to any available outlet. A number of exposures can be made in quick succession.

PRICE **£10 10s.**, OF ALL DEALERS.

For Studio or Room.

Shuts up in Cabinet form, 25 × 20 × 9.

Light, compact, and portable.

Sole Manufacturers: SALMON & SON, 169 Hampstead Road, London, N.W.

SANDERSON'S PATENT CAMERA

Fitted with UNIVERSAL FRONT and other important improvements, making it

THE MOST PERFECT CAMERA KNOWN.

IT has now been demonstrated **beyond dispute** that SANDERSON'S PATENT CAMERA is the **most perfect** in principle, and capable of work that **cannot be done** with any of the Cameras on the market.



It is the invention of a Photographer who has experienced **what is wanted.**

'At a recent contest in Cambridge the results obtained,' says the *Photographic News*, 'prove **incontestibly** the **superiority** of the Sanderson's Camera over the best Cameras **specially** constructed for Architectural work.'

Prices of 'A' Pattern SANDERSON CAMERAS.

For Plates.	Camera and 1 Slide.	Camera and 3 Slides.	Extra Double Slides. Each.
6½ × 4¼	£5 10 0	£6 15 0	£0 16 6
8½ × 6½	7 10 0	9 10 0	1 2 6
10 × 8	8 15 0	11 10 0	1 8 6
12 × 10	11 10 0	14 15 0	1 18 0
15 × 12	14 10 0	18 15 0	2 10 0

FULL DESCRIPTIVE PAMPHLET ON APPLICATION.

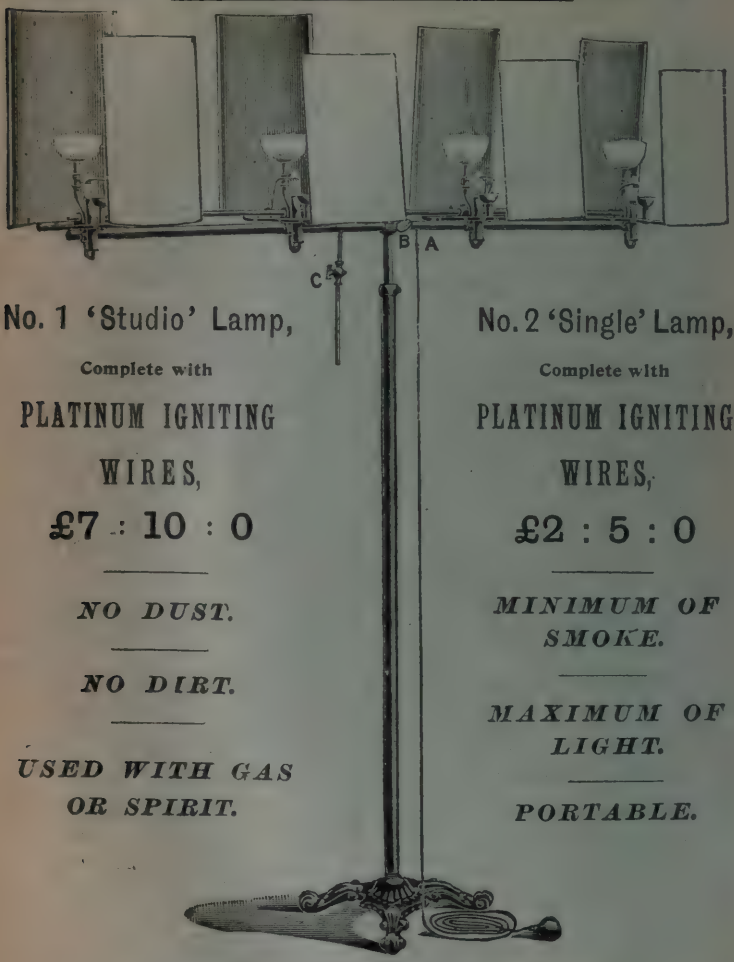
GEORGE HOUGHTON & SON,

89 HIGH HOLBORN, LONDON, W.C.

A A

[*See following pages.*

MALONI'S PATENT FLASH-LIGHT APPARATUS.



No. 1 'Studio' Lamp,

Complete with

PLATINUM IGNITING WIRES,

£7 : 10 : 0

NO DUST.

NO DIRT.

USED WITH GAS OR SPIRIT.

No. 2 'Single' Lamp,

Complete with

PLATINUM IGNITING WIRES,

£2 : 5 : 0

MINIMUM OF SMOKE.

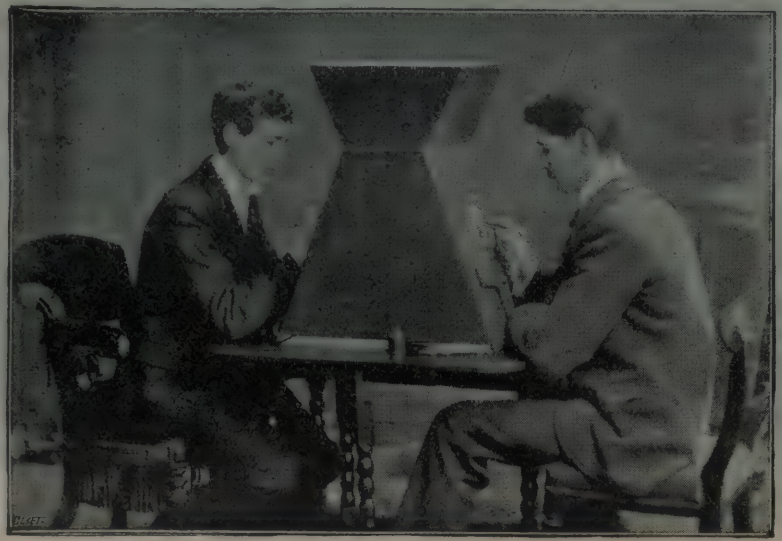
MAXIMUM OF LIGHT.

PORTABLE.

FULL DESCRIPTIVE PAMPHLET ON APPLICATION.

G. HOUGHTON & SON, 89 High Holborn, London, W.C.

The 'Professional' Retouching Desk.



For Incandescent Gas or Oil Lamp.

A RETOUCHING DESK FOR DARK DAYS.

LIGHT EQUAL TO DAYLIGHT.

Complete for Incandescent Gas, **35**/-

Complete for Oil, **30**/-

GEO. HOUGHTON & SON, 89 HIGH HOLBORN, LONDON, W.C.

A NOVELTY IN BURNISHERS.

A MACHINE HEATED BY STEAM.

AN ENTIRELY NEW PRINCIPLE.

The 'Helvetia' Burnisher.



THIS Machine is constructed on an entirely new principle, the Roller being heated internally by Steam, instead of by Gas or Spirit. It is undoubtedly the most perfect and best Machine in the market. The working is simplicity itself, and the Burnish obtained is magnificent.

The Advantages of this System are—

1. The Heat is always equal over the whole length of the Roller.
2. It is impossible to overheat the Roller, hence there is no danger of Blistering or spoiling Photographs.
3. The Roller is always the same temperature, never varying
4. There are no objectionable Gas Fumes.
5. It is heated ready for use in from 3 to 5 minutes.

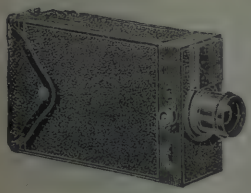
PRICES, with Quadruplex Gear, complete with Boiler & Spirit Lamp, &c.

10 inch	... ...	£4 15 0		18 inch	... ...	£7 10 0
14 ,,	... ...	6 10 0		20 ,,	... ...	8 10 0

GEORGE HOUGHTON & SON,

89 HIGH HOLBORN, LONDON, W.C.

THE
'Triad' Pocket Camera
(PTENT).



CLOSED FOR THE POCKET.

The great point of novelty with this Camera is its wonderful compactness when closed, which is attained in an entirely original manner.

IT closes up in such a convenient form that it can be carried in the breast pocket with the same ease as an ordinary pocket book, and its bulk is so unobtrusive that one might have it in the pocket for days together without even knowing it is there. When required for use, however, it is taken from the pocket and **instantly set up for working by one rapid and simple movement,** and it can be closed and returned to the pocket with the same ease and facility.



OPENED FOR USE.
Changing a Plate.

The 'TRIAD' POCKET CAMERA carries six Plates or Films, $3\frac{1}{2} \times 2\frac{1}{2}$ inches, in sheaths, changed on the well-known bag principle, and is fitted with the best quality Lens, View Finder, Time and Instantaneous Shutter with Speed Regulator, and Indicator showing number of plates exposed.

No. 1 'TRIAD' CAMERA, £3 3s.
Complete with Single Lens.

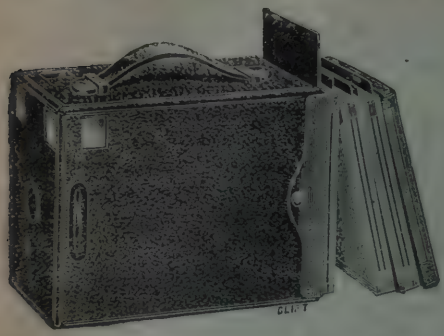
No. 2 'TRIAD' CAMERA, £4 4s.
Complete with R.R. Lens with Iris Diaphragm.

No. 3 'TRIAD' CAMERA, £7 7s.
Complete with Ross-Zeiss Lens with Iris Diaphragm.

Descriptive Pamphlet Post Free.

GEORGE HOUGHTON & SON,
89 HIGH HOLBORN, LONDON, W.C.

THE 'Expert' Hand Camera



For Plates $4\frac{1}{4} \times 3\frac{1}{4}$.

Three Double Dark Slides.

Time and Instantaneous Shutter.

Two Brilliant View Finders.

Excellent quality Single Achromatic Lens with Rotary Stops.

The Slides are of special construction, and six of them can be carried *inside the Camera* when not in use.

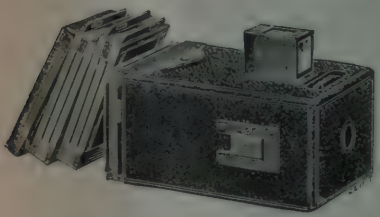
Outside size, $7\frac{1}{4} \times 5\frac{1}{4} \times 4$.

30/-

Weight with 3 Slides, under 2 lbs.

Extra Double Dark Slides, **2/6** each.

THE 'EXPERT' POCKET HAND CAMERA.



For Plates $2\frac{5}{8} \times 1\frac{5}{8}$ (quarter $\frac{1}{4}$-pl.).

Three Double Dark Slides, carried inside Camera when not in use.

Time and Instantaneous Shutter. Single Achromatic Lens.

Brilliant View Finder.

Outside size, $4\frac{3}{4} \times 3\frac{1}{4} \times 2\frac{1}{4}$.

17/6

Weight with 3 Slides, under 11 ozs.

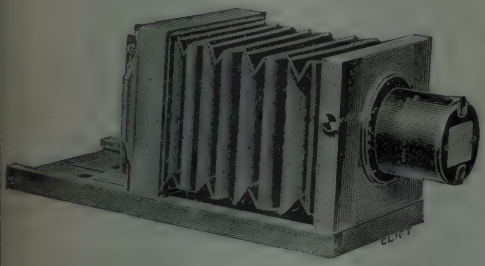
Extra Double Dark Slides, **1/6** each.

GEORGE HOUGHTON & SON,

89 HIGH HOLBORN, LONDON, W.C.

THE 'P.K.' DAYLIGHT ENLARGER.

Suitable for Enlarging up to $6\frac{1}{4} \times 4\frac{3}{4}$ in. from Negatives taken with the 'Pocket Kodak,' 'Criterion,' 'Holborn Pocket,' 'Expert Pocket,' and all other Cameras taking Plates or Films about $2\frac{1}{8} \times 1\frac{5}{8}$ in.



Complete,

31/6

—:o:—

Tube Front, with Lens, Exposing Shutter, Carrier, &c., only,

8/6 each.

THE 'P.K.' ENLARGING APPARATUS consists of two separate and distinct parts : 1st. A sliding metal Tube, with inner tube lined with velvet and fitted with Lens, exposing Shutter and Carrier to hold Negatives.

2nd. A thoroughly well made polished mahogany Enlarging Camera with extending base, cloth bellows, and single slide to take either Bromide Paper or Plates.

The Apparatus can be supplied either complete, or where intending purchasers already possess a suitable Camera, the Sliding Tube fitted with Lens, &c. is all that is necessary.

In the latter case a wooden front is supplied for adapting to front of own Camera.

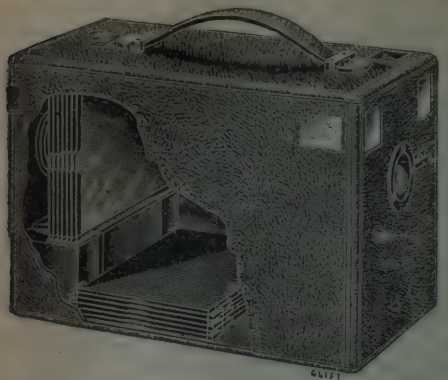
The small wooden Negative Carrier in front of metal tube is made to take Plates or Films $2\frac{1}{8} \times 1\frac{5}{8}$ in., and can easily be adjusted in any position, thus ensuring the picture being correctly centred.

The Sliding Tube front and the Enlarging Camera both being adjustable, any size Enlargement up to $6\frac{1}{2} \times 4\frac{3}{4}$ in., such as $4\frac{1}{2} \times 3\frac{1}{4}$ in. or 5×4 in., can be obtained. This is a decided advantage, as all Negatives will not bear enlarging up to $\frac{1}{2}$-plate, and it is sometimes desirable to enlarge only a portion of the Negative to a required size. This cannot be done with a fixed Enlarging Apparatus.

GEORGE HOUGHTON & SON,

89 HIGH HOLBORN, LONDON, W.C.

THE 'RANGER' HAND CAMERA.



COMPLETE
£2 5s.

THE 'RANGER' HAND CAMERA is in every way perfect All the working parts in connexion with the Shutter, &c., being sunk in a small space in base of Camera, and there being no projecting parts, the Camera is thus far less obtrusive than most others.

THE LENS AND SHUTTER are attached to a front, which is constructed separately from the body, so that if desired they can be easily removed for cleaning, &c., and re-adjusted without difficulty.

THE CAMERA CARRIES 12 ¼-PLATES in Sheaths, lengthways, this being the most generally required position of the Plate.

THE CHANGING ARRANGEMENT, which is absolutely certain, is effected by means of a button on top of Camera, and any exposed Plates can be withdrawn from bottom of Camera without interfering with the unexposed ones.

The Camera is covered in best grained morocco, and is fitted with two **BRILLIANT VIEW FINDERS** for upright and oblong Pictures, divided with lines for ease in centreing the picture ; an **AUTOMATIC INDICATOR** showing number of plates exposed, and a strong handle for carrying.

THE ACHROMATIC VIEW LENSES are specially selected, and give excellent results. The sliding Diaphragms are easily adjusted from front of Camera.

THE SHUTTER, which is **Ever-set**, gives either **Time or Instantaneous Exposures**, and the latter can be regulated to give six different speeds, this being an advantage which cannot fail to be appreciated.

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[*See preceding pages.*

LIKE A PACK OF CARDS



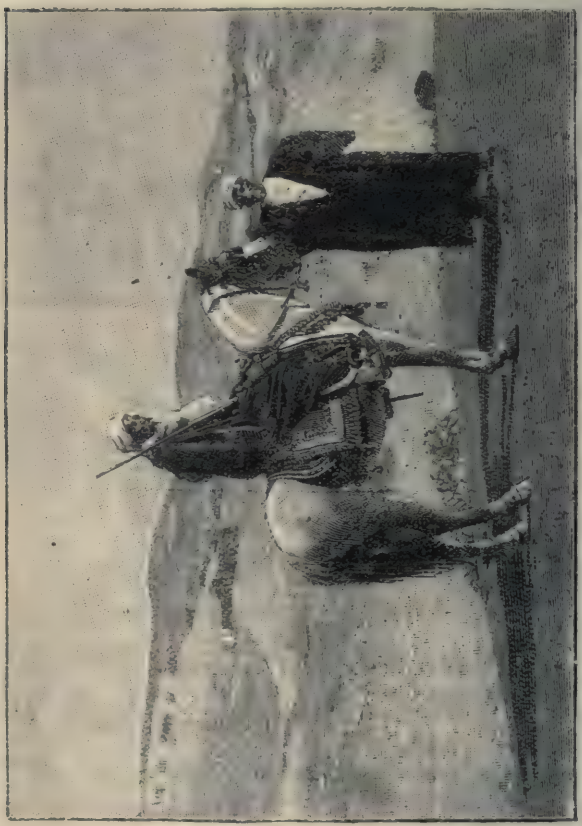
FORTY FLAT FILMS

THE "Frena" CAMERA

R. & J. BECK, Ltd., 68 Cornhill, London E.C.

West End Agents:—
LONDON STEREOSCOPIC Co., 106 & 108 Regent Street, W.

See following pages.



From a Photograph taken with a No. 2 (¼ plate) Frena.

The Frena in the Desert.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

THE SALES THIS YEAR HAVE BEEN ENORMOUS!

THE FRENA.

Yes, most people know it is a camera—a good camera—not now an expensive camera. They may know, also, that it exposes flat films. But how few realise what other qualities the Frena possesses.

It is a camera which

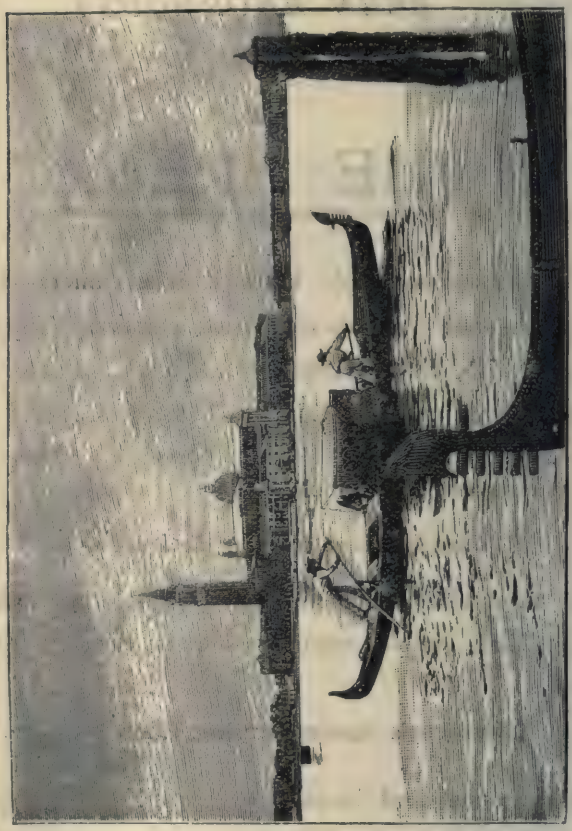
Can be Used by the Entire Novice.

Its manipulation is perfectly simple, and, moreover, even that simple manipulation is clearly explained in a

Handbook Accompanying Each Camera.

Thus no one need hesitate to commence photography. No doubt mistakes, which experience will obviate, will be made by the beginner, but a fair proportion

The Frena for the Artist.



VENICE

From a Photograph taken with a No. 2 (½ plate) Frena.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

of his first pictures will be good, and the use of the Frena is

Simple Enough to Content the Most Accomplished Idler.

The Frenographer may either develop and print his own pictures, or they may be sent to us to be finished.

By careful design the adjustments have been made extremely simple, yet they are in every way as efficient as those of the most elaborate cameras on the market. The Frena can be unloaded and re-charged with forty fresh films in less than three minutes.

The Frena

CARRIES FORTY FLAT FILMS

upon which the photographs are taken. These are placed into the camera in a pack, just as procured from the dealers, the pack being merely unwrapped and inserted as a whole into the camera in a dark room "like a pack of cards." For travellers, tourists,

The Frena for the Tourist.

GAMBLING GONDOLIERS. From a Photograph taken with a No. 2 (¼ plate) Frena.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

or one may almost say all hand camera users, films are indispensable. Photographic glass plates are impossible. Forty plates would weigh several pounds instead of ounces. To carry a large supply of glass plates on a holiday means a special portmanteau. In fact, it is fast being realised that photographic

Films are a Necessity.

The enormous sale of the Frena has proved that our system of exposing films has filled an actual want. We are now enabled to offer this camera in a new model of a somewhat smaller size at a

CHEAP PRICE.

The Memorandum Size Frena carries a film

3½ Inches × 2⅝ Inches,

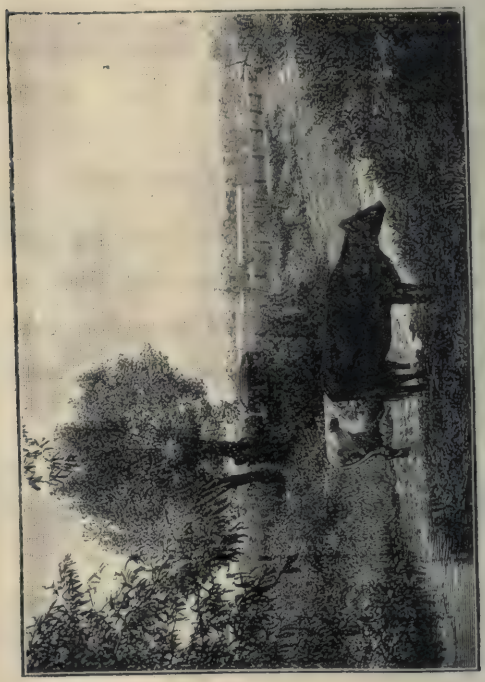
which, although smaller than the standard ¼-plate size, makes a very satisfactory and useful picture.

We are also putting on the market a

Cheap Film called Setoloid,

on a new support similar to celluloid but with a matt surface.

The Frena for Landscapes.



WOODFORD.

From a Photograph taken with a No. 00 (Memorandum) Frena.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pag*

THE FRENA No. 00 (Memorandum Size).

$3\frac{1}{2}$ in. × $2\frac{5}{8}$ in. Single Lens Form.



TECHNICAL DATA.

Lens	$4\frac{1}{4}$ in. Beck Achromatic Single Lens.
Aperture	*f*/11, diaphragms, *f*/16, *f*/22, *f*/64.
Focus	Fixed. Range (*f*/11): Horizon to 14 feet. Frena Magnifiers may be added for objects as near as 3 feet.
Size of Film...	$3\frac{1}{4}$ in. × $2\frac{5}{8}$ in.
Size of Picture	$3\frac{1}{2}$ in. × $2\frac{5}{8}$ in.
Full Charge...	2 packs, *i.e.*, 40 films.
Speed of Shutter...	$\frac{1}{5}$ $\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ of a second; and time exposures.
Indicator showing number of films used	Right hand side of case.
Swing Back	Can be used about 20° with smallest stop.
Finders..	For vertical and horizontal pictures respectively.
Tripod Sockets	To order only.
Weight, charged with 40 films,	$2\frac{3}{4}$ lbs.
Dimensions...	$9\frac{1}{2}$ in. × 5 × $3\frac{1}{2}$ in.

PRICE—Camera, £2 15s.; 40 Setoloid Films, 3s. 8d.

No. 00. £2 18s. 8d.

FRENA MAGNIFIERS, Set of Three in Case, **7s, 6d.**

PRESENTATION MODEL.

Covered in buff calf leather, with polished brass fittings and 40 setoloid films.

No. 00. £4 8s. 8d.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

The Frena at Home.



From a Photograph taken with a No 00 (Memorandum) Frena.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

FRENA No. 0 (Memorandum Size.)

$3\frac{1}{2} \times 2\frac{3}{8}$. Rapid Rectilinear Lens Form.



TECHNICAL DATA.

Lens	$4\frac{1}{4}$ in. "Autograph" Rapid Rectilinear.
Aperture	$f/8$, diaphragms $f/11$, $f/16$, $f/22$, $f/64$.
Focus	Fixed. Range ($f/11$): Horizon to 14 feet. Frena Magnifiers may be added for objects as near as 3ft.
Size of film	$3\frac{1}{2}$ in. × $2\frac{3}{8}$ in.
Size of picture	$3\frac{1}{2}$ in. × $2\frac{3}{8}$ in.
Full charge	2 packs, *i.e.*, 40 films.
Speed of Shutter ...	$\frac{1}{5}$ $\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ of a second; and time exposures.
Indicator showing number of films used ...	Right hand side of case.
Swing back	Can be used about 20° with smallest stop.
Finders	Two—for vertical and horizontal pictures respectively.
Tripod sockets	Two—and screw for affixing to tripod.
Weight (charged with 40 films),	$2\frac{3}{4}$ lbs.
Dimensions	9 in. × 5 in. × $3\frac{1}{2}$ in.

PRICE—Camera, **£5 0s. 0d.**; 40 celluloid films, **5s. 0d.**

Frena Magnifiers, set of 3, in case, **7s. 6d.**

No. 0. £5 5s.

PRESENTATION MODEL.

Covered in buff calf leather, with polished brass fittings and 40 celluloid films.

No. 0 **£6 15s. 0d.**

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

The Frena for the Naturalist.



From a Photograph taken with a No. 1 (¼ plate) Frena

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

THE FRENA No. 2 (Quarter-pl. size).

4¼ inches × 3¼ inches.



TECHNICAL DATA.

Lens	5½ 'Autograph' Rapid Rectilinear.
Aperture	*f*/8, Diaphragms *f*/11, *f*/16, *f*/22, *f*/64.
Focus	Fixed. Range (*f*/11): Horizon to 20 feet. Frena Magnifiers may be added for objects as near as 3 feet.
Size of Film	4¼ in. × 3¼ in.
Size of Picture	4¼ in. × 3 in.
Full Charge	2 packs, *i.e.*, 40 films.
Speed of Shutter	⅛ ¹⁄₁₀ ¹⁄₂₀ ¹⁄₄₀ ¹⁄₈₀ of a second ; and time exposures.
Indicator showing number of films used...	Right hand side of case.
Swing Back	Can be used about 20° with smallest stop.
Finders	2—for vertical & horizontal pictures respectively.
Tripod Sockets	2—and Screw for affixing to Tripod.
Weight, charged with 40 films,	4 lbs.
Dimensions	11½ in. × 5½ in. × 4½ in.

PRICE—Camera, £8 9s.; 40 Films (Celluloid), 8s. 6d,

No. 2. £8 17s. 6d.

FRENA MAGNIFIERS, Set of Four, in Case, **10s. 6d.**

Presentation Model.—Covered in buff calf leather, with polished brass fittings and 40 celluloid films.

No. 2. £10 10s. 0d.

R. & J. BECK, LTD., 86 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

Frena for the Architect.



CANTERBURY CATHEDRAL.
From a Photograph taken with a
No. 3 (5 in. × 4) Frena.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

The FRENA No. 3 (5 in. × 4 in. size).



TECHNICAL DATA.

Lens	6½ in. 'Autograph' Rapid Rectilinear.
Aperture	*f*/8, diaphragms *f*/11, *f*/16, *f*/22, *f*/64.
Focus	Fixed. Range (*f*/11): Horizon to 30 ft. Frena Magnifiers on revolving diaphragm in camera front. Range *f*/11, No. 1, 30-12 ft.; No. 2, 11-6½ ft.; No. 3, 5½-4½ ft.; No. 4, 4-3½ ft.
Size of Film	5 in. × 4 in.
Size of Picture	5 in. × 3¾ in.
Full Charge	4 packs, *i.e.*, 40 films.
Speed of Shutter	¼ ⅛ 1/10 1/25 1/50 1/100 of a second; and time exposures.
Indicator showing number of films used	Right hand side of case.
Swing Back	Can be used about 20° with smallest top.
Finders	2, for vertical and horizontal pictures respectively.
Tripod Sockets	2, and screw for affixing to tripod.
Weight, charged with 40 films	5¼ lbs.
Dimensions	12½ in. × 6½ in. × 5½ in.

PRICE (including Frena Magnifiers)—**Camera, £12; 40 Films** (Celluloid), **12s.**

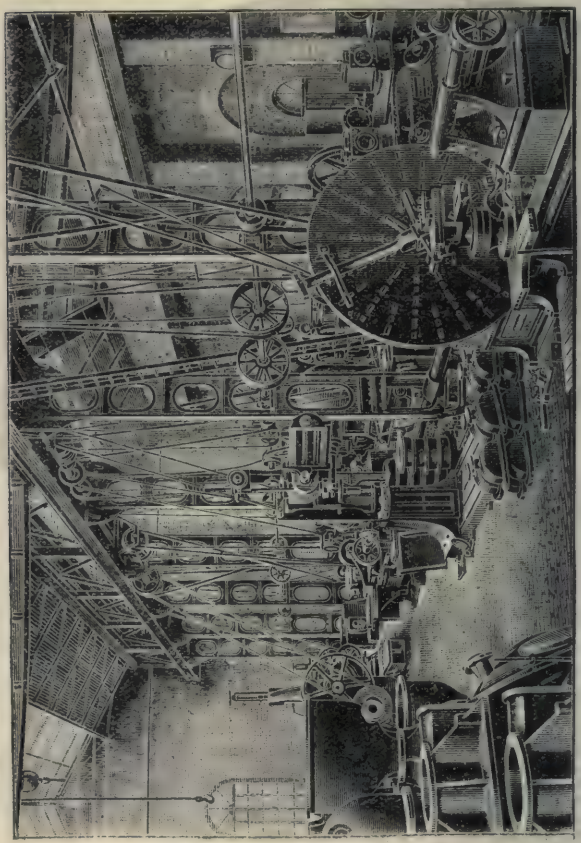
No. 3. £12 12s Od.

Presentation Model.—Covered in buff leather with polished brass fittings, with 40 celluloid films, **£14 14s. 0d.**

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

The Frena for the Engineer

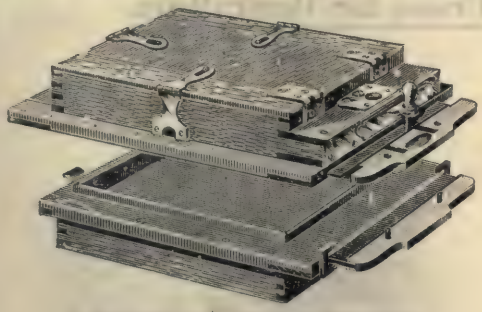


From a Photograph taken with a No. 2 (4 plate) Frena.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

The Frena Film Holder.



A Magazine and Receiver, Separated.

The Frena Film Holder can be fitted to any tripod camera, like an ordinary dark slide.

It carries twenty cut sheet films, or any smaller number, and changes these automatically, 'like a pack of cards.'

The Frena Film Holder is adapted to ordinary cameras by simply planing down the edges of the magazine. The only alteration requisite in the camera to which it is to be attached is a re-adjustment of the focussing screen. If it is desired to avoid even this alteration, then another focussing screen, having the same register as the Film Holder, may be employed.

PRICES.

Quarter-plate Size ($4\frac{1}{4}$ in. × $3\frac{1}{4}$ in.)	**£2 10 0**
5 in. × 4in. Size	**£2 15 0**
Half-plate Size ($6\frac{1}{2}$ in. × $4\frac{3}{4}$ in.)	**£3 0 0**

Fittings to Camera extra.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

The Frena for Portraiture.



From a Photograph taken with a No. 2 (¼ plate) Frena.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

Extracts from Letters from Correspondents.

Canterbury. 15th Sept., 1896.—With the Frena No. 00 I am delighted. It is the best hand camera I have ever seen in 10 years' experience.

Norwich, 15th Sept., 1896.—You will be pleased to hear that the Frena I had from you is doing splendid work. During my holidays, just over, I exposed 18 films and got 17 pictures, giving splendid detail, the other one being slightly under-exposed; and I must say that the more I use it, the more I regret that I did not have one sooner.

Edinburgh, 21st Feb., 1895.—In my opinion no hand camera can touch the Frena!

Tunbridge Wells, 24th April, 1896.—I purchased about this time last year one of your Frenas, and I must say I never handled a hand camera I like better.

Alresford, Hants, 11th July, 1896.—Since I bought a No. 2 Frena from you two years ago I have had three other quarter-plate cameras, two of them very expensive ones, indeed one of them cost nearly three times as much as the Frena. I had better have remained faithful to the Frena, for I find it a more useful, simple, and handy article than either of the others.

Bradford.—Having purchased one of your Frenas No 2 three years ago, allow me to say that I have great pleasure in bearing testimony to the excellent results that can be got by the very charming little instrument. I have no less than four other cameras, but for Continental tours, mountain scenery, etc., I am delighted.

St. Petersburg, 23rd Oct., 1896.—With the Frena No. 3 you sent me this summer I am very contented, it is the nicest hand camera I have ever had.

Malvern, 16th Nov., 1895.—Frena "Memorandum" arrived safely and gives entire satisfaction; it is a marvel of ingenuity and skill.

Somerset, Aug., 1896.—Having given the 5 × 4 Frena a good trial I must say I am exceedingly pleased with its construction. The perfect arrangement of magnifiers, its smoothness in working, and above all the splendid definition of the lens. The tendency of most lenses is to fall off in definition as they increase in size, but I find that quality in the 5×4 as perfect in every way as the ¼ plate. We have had to wait for the issue of this size for a considerable time, but certainly it proves to be worth waiting for. I have just purchased one of the Memorandum size for my son, and it is to my mind a marvel of cheapness, the work in it being quite of the Frena quality and class. I doubt not they will become exceedingly popular.

Cambridge, 6th Nov., 1896.—My friends' experience with other hand cameras have proved to me the superiority of my Frena to any camera of the kind in the market.

Ilkley, 23rd Sept., 1896.—The Frena No. 3 is the very best hand camera I have ever used, and works perfectly.

Sarawak, 6th Sept., 1896.—I have received the Frena which was ordered from you in January last,-and I cannot say too much of it. Some American gentlemen who happened to come to this country to explore were delighted with it, and said that there was no camera made in the States that could compare with it.

R. & J. BECK, LTD., 68 CORNHILL, LONDON, E.C.

[*See preceding and following pages.*

THE FRENA.

FIRST QUALITY LENS

giving superb definition.

FORTY FLAT FILMS

changed one by one by the movement of a handle.

FINDERS

large and accurately adjusted.

SHUTTER

giving perfect control of exposure.

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for architecture, etc.

SIMPLE TO USE

and withal

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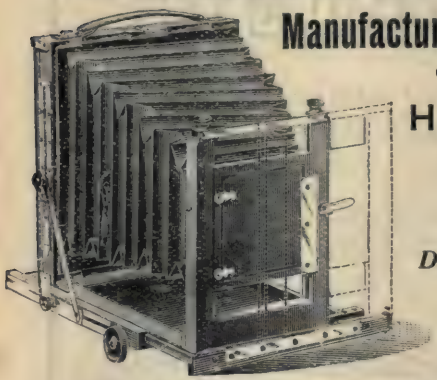
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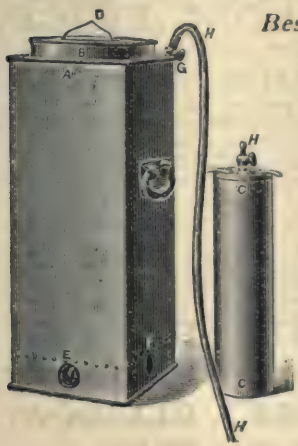
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(Patent.)



Best for Photographers,

Best for Lantern Work,

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Perfectly Automatic. Absolutely Reliable.
Thoroughly Safe. Extremely Simple.
Easily Charged. Strongly made.

Has won the commendation of all who have used it or seen it in use. Price **35/-**

The Abingdon Lantern Jet (Pat.)

gives the maximum of light.

The only Jet with adjustable reflector and independently controlled burners.

Price **10/6.**

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R. J. MOSS & CO.,

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A High-Grade Camera

42/-



42/-

AT A LOW PRICE.

SMITH'S INVINCIBLE MAGAZINE CAMERA is a high-class Instrument at a moderate price. The Lens is a superior Rapid Meniscus specially ground for this Camera. It has an **IMPROVED FOCUSSING ARRANGEMENT** with a Graduated Scale, showing at what distance objects are in Focus.

Time and Instantaneous Shutter, with variable speed, indicated from $\frac{1}{10}$th to $\frac{1}{40}$th of a second. Long exposures may also be given without having to hold the Shutter open with the hand. Two Brilliant View Finders for upright and oblong pictures.

It carries 12 plates, and the changing mechanism may be depended upon to change the plate with absolute **PRECISION.**

The Camera is covered in hard grained leather, and the workmanship and finish is most superior and equal to anything on the market at double the price.

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STEREOSCOPIC NEGATIVES WANTED.—Subjects of General Interest (Inland and Abroad) for Publication. The following classes, among others, are desired:—Pretty 'Bits' of Scenery *anywhere*, to which fanciful titles could be given, *e.g.*, 'A Quiet Nook,' 'The Angler's Paradise,' 'A Rustic Bridge.' A posed female figure, or figures, in such scenes, may frequently increase the merit as a 'Picture.' Places of *universal* interest to all English-speaking peoples. Rural Scenes, Animals, Landscapes, Marine Views, Lakes, Rivers, Waterfalls, Instantaneous Street Scenes, any striking Views anywhere Inland or Abroad. Natives of Oriental and other Countries—Portraits, Groups, Characteristic Scenes. Studio Portraits, Tableaux, Living Pictures, Beautiful Women, Actresses—in theatrical or fancy costumes. Any number of negatives purchased. Photographers who possess Stereoscopic Apparatus please write, and an order may be given to take Stereoscopic Views in your locality. Write, *enclosing Specimen Prints*, or suggest suitable subjects of which you could make Negatives to order. Only *Stereoscopic* Negatives required. Any specimen prints sent will be paid for. Address MR. RICHARDS, 168 Choumert Road, Peckham, London.

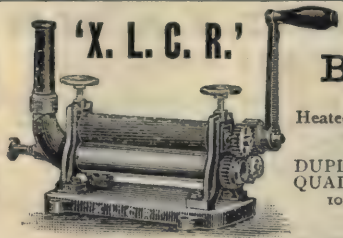
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Heated internally by Gas or Spirit. Both rollers nickelled. Satisfaction guaranteed.

DUPLEX GEAR—6 in. rollers, 21/-; 8 in., 38/-
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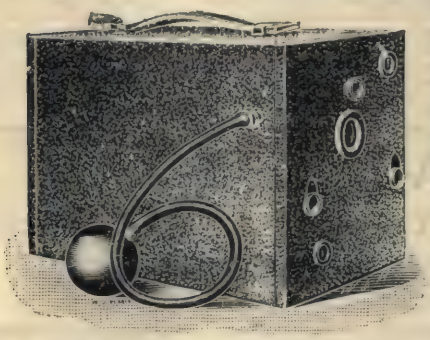
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AUSTRALASIA.—From ALFRED HAY, Esq., Boomanoomana Mulwala, New South Wales :—'Please send me three large bottles of "HINTOKINONE." I am very much pleased with it.'

HINTOKINONE is sold only in 5-ounce and 10-ounce square glass-stoppered Bottles. The 5-ounce size will make 60 ounces (2½ pints) of Developer, price 2/3, or, if packing and inland postage is included, 3/- ; the 10-ounce size will make 120 ounces (5 pints) of Developer, price 4/3, or, if packing and inland postage is included, 5/3. For exportation, in Zinc-lined Boxes, containing each 1 dozen bottles, 28/6 for the 5-ounce size, 54/- for the 10-ounce size.

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THE BEST OF ALL! THE CHEAPEST OF ALL !! THE MOST COMPACT OF ALL !!!

Reasons for the extraordinary popularity of HINTO-KINONE.

HINTO-KINONE does the best possible work with the least possible trouble; requires only simple dilution with cold water, and is ready for use instantaneously. There is no waiting for something to dissolve. A small 5-ounce bottle will make 50 ounces of Developer in such quantities as may be required from time to time.

HINTO-KINONE will develop all good plates, films, and papers.

HINTO-KINONE does not stain the fingers nor create sores and skin diseases upon the hands.

HINTO-KINONE has proved for seven years that its virtues remain unimpaired by time or climate, either tropical or arctic.

HINTO-KINONE is an Expert's developer; the finest possible effects are obtained by it. The softness and delicacy of the half-tones cannot be improved upon, and density may be obtained to any extent by the graduated addition of Bromide Solution, according to the Instructions supplied with each bottle. It is never necessary, as in the case of some so-called developers, to employ secondary development to obtain sufficient density for printing purposes.

HINTO-KINONE is a Beginner's developer; you cannot improve upon it, and if you cannot fetch a good negative with HINTO-KINONE it is a waste of time and material to try anything else.

HINTO-KINONE produces the richest and most pleasing tones for Lantern Slides and Decorative Transparencies.

HINTO-KINONE is generally acknowledged to be unequalled; it has fairly beaten every other developer in the market, and is annually increasing its sales by leaps and bounds.

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HINTO-KINONE has never required apologies and explanations to be formulated for failures and disappointments attributable to any irregularity of its action—it is always the same, reliable, uniform, and satisfactory. It has never been found necessary to announce '*Improvements*' in the manufacture of HINTO-KINONE.

Full Direction Pamphlet enclosed with every Bottle.

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Still maintain the reputation of satisfying buyers, with the best value, as serviceable and well-made Apparatus, in the market.

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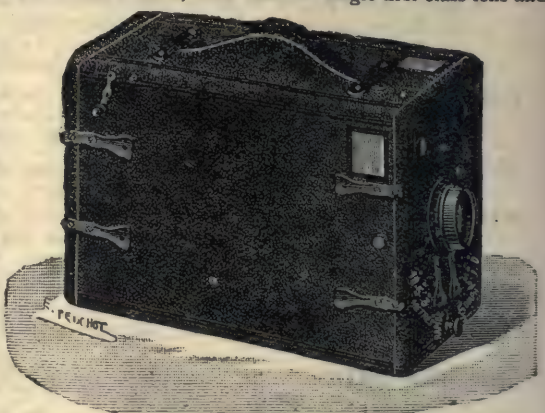
Finder shows the full size image, and focussing.

A perfect and compact Hand Camera, possessing all the advantages of a Twin-Lens Camera, with only half its bulk, weight, and price. Price from **£5** to **£13** for ¼-plate. For 5×4 and ½-plate, **£14** and upwards.

Hinton's 'Express' Quarter-Plate Hand and Stand Camera, for 12 plates or films, is the smallest, lightest, and simplest in the world. Covered neatly in morocco leather, with selected single first-class lens and time and instantaneous shutter, **£3**; or with selected R.R. lens, adjustable shutter, and additional focus changing arrangement for portraits and groups, price, complete, **£5 10s.** Dimensions, 8½ × 6½ × 4. Weight, 2lbs. 13ozs.

CAUTION.

This Camera, the Greatest Success in the Trade in its class, is honoured by scores of inferior imitations. See that each Camera bears the well-known name of HINTON & Co.

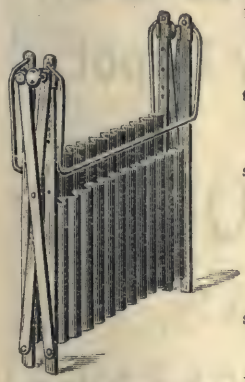


Many other forms of valuable Apparatus and Lenses, both new and secondhand, may be seen and purchased at HINTON'S.

HINTON & CO., 38 Bedford St., Strand, London.

[*See preceding and following pages.*

HINTON'S
New Patent Adjustable Folding Rack.



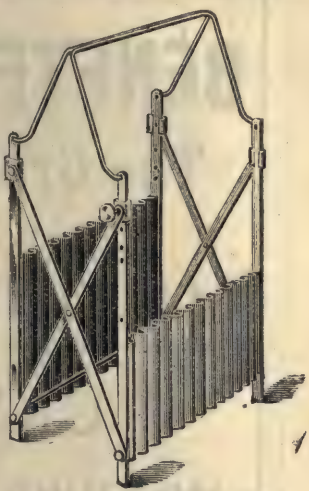
PRICES.

Lantern to Whole-plate, **5/-**

Tank with syphon for ditto, **5/-**

Lantern to 12 × 10 **7/6**

Tank with syphon for ditto, **7/6**



A.—Rack folded when not in use.

B.—Rack partly expanded for plates.

This rack has been especially designed to meet the requirements of photographers working more than one size. *Any* sized plate may be put into the rack from Lantern size to *whole plate* in the *small* size, and from Lantern size to 12×10 in the large size. The rack is perfectly rigid, has no loose pieces, is most easily fixed to required size, and folds flat in small space.

HINTON'S FILMS.

ORDINARY (Sensitometer, 18 to 25).

ULTRA RAPID (Sensitometer, 28 to 30). Quickest in the Market

PRICES PER DOZEN.

	Ordinary.	U. Rapid.		Ordinary.	U. Rapid.
4¼ × 3¼	1/9	2/6	8½ × 6½ ...	7/6	10/-
5 × 4	3/-	4/-	10 × 8 ...	12/6	16/-
6½ × 4¾	4/-	5/6			
7½ × 5	6/-	7/6	12 × 10 ..	18/-	23/-

HINTOTYPE PAPER.

The ease with which cleanliness of prints, brilliancy and agreeable tones are obtained by the use of this absolutely perfect paper, have attached to it numbers of the best workers, and beginners invariably produce better work with it than with any other.

PRICES PER DOZEN.

¼	5×4	6×4	½	7½×5	¼	10×8	12×10	15×12	Full sheets.
-/9	1/-	1/3	1/6	1/9	2/9	4/-	6/-	9/-	17/6

Send for one of Hinton's Photographic Priced Paper Lists, and choose from the BEST and choicest Papers in the market.

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With Hundreds of Illustrations.

89, 90, 107 and 108
CHEAPSIDE, LONDON, E.C.

[*See pages* 423 *to* 429.

E. & T. UNDERWOOD,

Patentees and Manufacturers of

PHOTOGRAPHIC APPARATUS

(Telegraphic Address: 'Instanto, Birmingham'),

BRUNSWICK WORKS,

130 to 132 Granville Street, Birmingham, ENGLAND.

London Agency:—BENETFINK & CO.,

89, 90, 107, 108 CHEAPSIDE, E.C.

A reliable Camera and a good Lens are absolutely necessary for the production of first-class Photographs. As good results are obtained, in competent hands, with our Cameras and Lenses, as with any Instruments in the market, no matter what the price.

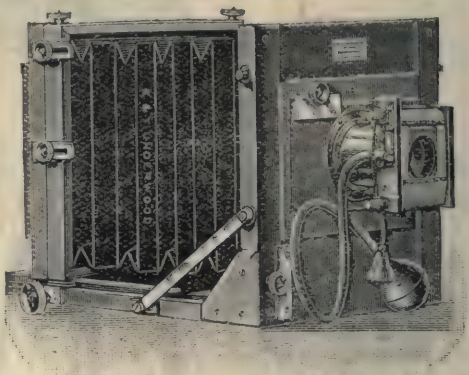
FULL ILLUSTRATED CATALOGUE, FOUR STAMPS.

[*See following pages.*

E. & T. UNDERWOOD

THE 'INSTANTO.'

Camera, Double Back, Tripod Stand, Lens,



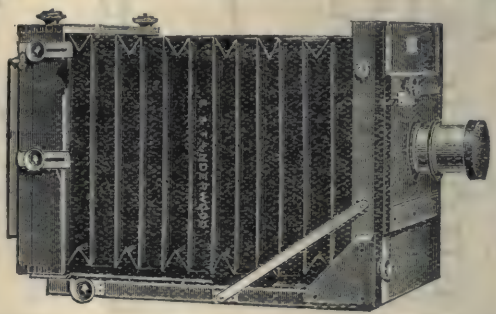
Time and Instantaneous Shutter.

Price Complete,

¼-plate, **£2 4s. 6d.**, ½-plate, **£4 4s.**, Whole-plate, **£6 6s.**

THE 'RECTILINEAR INSTANTO.'

For full particulars



see Illustrated Catalogue, 3 stamps

Complete Apparatus,

¼-plate,	**£2 8s. 6d.**	½-plate,	**£4 2s.**	Whole-plate,	**£6 2s.**
,,	**£2 14s.**	,,	**£4 12s.**	,,	**£6 14s.**
		,,	**£5 6s.**	,,	**£8 4s.**

BRUNSWICK WORKS, 130-2 GRANVILLE STREET,

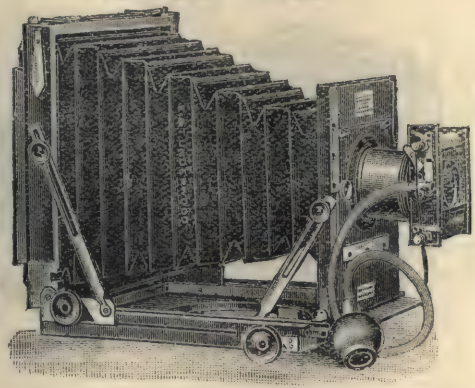
[*See preceding and following pages.*

Patentees and Manufacturers.

THE 'FIELD.'

Complete Apparatus, ¼-plate, £2 4s. 6d., ½-plate, £4 4s., Whole-plate, £6 6s.

For full details see Illustrated Catalogue.

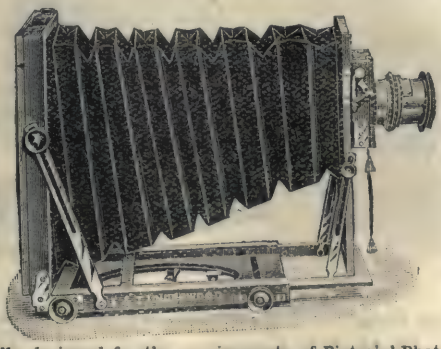


Every modern movement and convenience. Thoroughly up to date.

THE NEW CAMERA . . .

. . . THE 'UMBRA.'

New patent exposer, giving extra exposure to foreground at will.



Double pinion extension, racking from longest to shortest focus.

Specially designed for the requirements of Pictorial Photography.

FOR FULL DETAILS SEE ILLUSTRATED CATALOGUE.

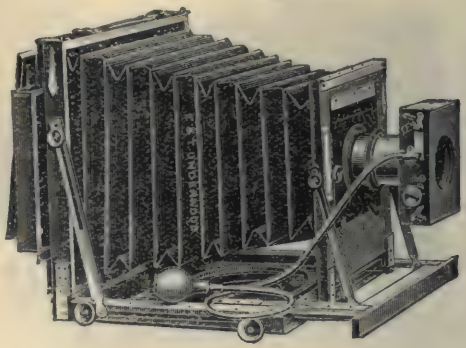
BIRMINGHAM.

[*See preceding and following pages.*

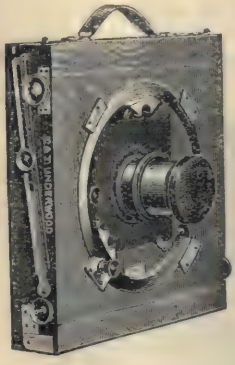
E. & T. UNDERWOOD,

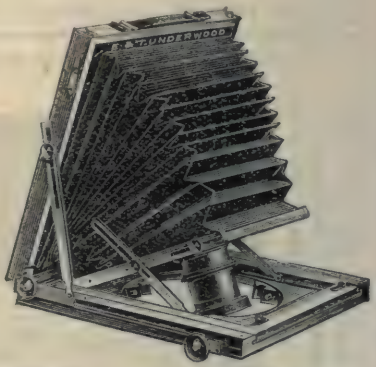
THE 'CLUB.'

First Quality.
Complete Apparatus.



Thoroughly Sound Workmanship.
Thoroughly Seasoned Material.
Fine Finish.





Complete Apparatus.

Meniscus Lens.		Rectilinear Lens.	
½-plate ...	£5 10 0	½-plate ...	£7 2 0
¼-plate ...	7 10 0	¼-plate ...	10 2 0

For complete particulars, see Illustrated Catalogue, 3 stamps.

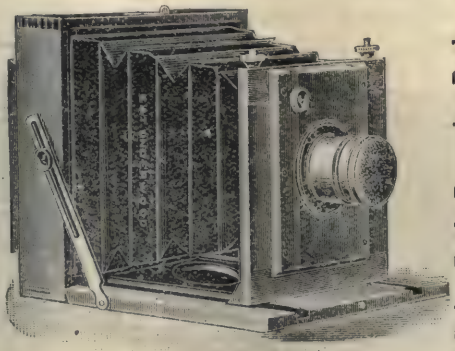
Patentees and Manufacturers.

[*See preceding and following pages.*

130-132 Granville Street,

THE 'TOUROGRAPH.'

Camera, Lens, Double Back, and Stand.



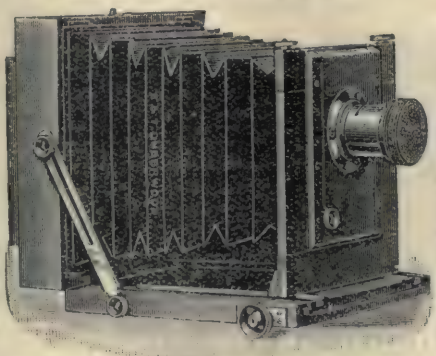
Swing Back, Reversing Back, Rise and Fall Front.

¼-plate	...	£1 7 6
½-plate	...	2 2 0
1-plate	...	3 12 0

THE 'SCENAGRAPH.'

With Meniscus Lens.

¼-plate	...	£1 11 6
½-plate	...	2 18 0
1-plate	...	4 4 0



With Rapid Rectilinear Lens.

¼-plate	...	£2 2 0	£2 10 0
½-plate	...	3 6 0	3 18 0
1-plate	...	4 8 0	5 0 0

Full details, see Illustrated Catalogue, 3 stamps.

Double Extension Camera, Lens, Double Back, and Stand.

BIRMINGHAM.

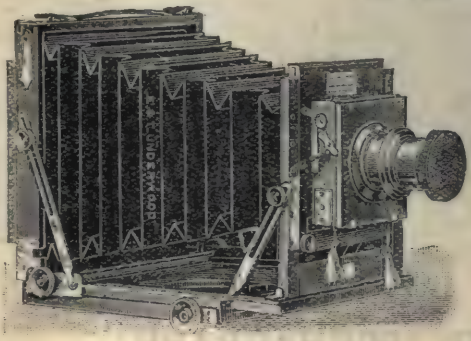
[*See preceding and following pages.*

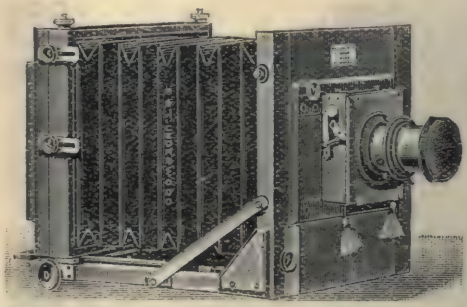
E. & T. UNDERWOOD,

FOREGROUND * * PATENT.

Exposing-behind-Lens Shutter,

* * * INSTANTO.





THESE cameras are fitted with a new patent shutter of the roller blind type, by means of which any desired increase of exposure to the foreground may be given. An ordinary equal illumination exposure may be given, the shutter may be set open for any length of time, and an instantaneous exposure of fixed duration may be made. The shutter is operated by the hand, pneumatic pressure being unnecessary. It is attached to the camera front, so that any lens may be used with it.

FOREGROUND * * *

Exposing-behind-Lens Shutter,

PATENT. * * FIELD.

Brunswick Works, 130-132 Granville St.,

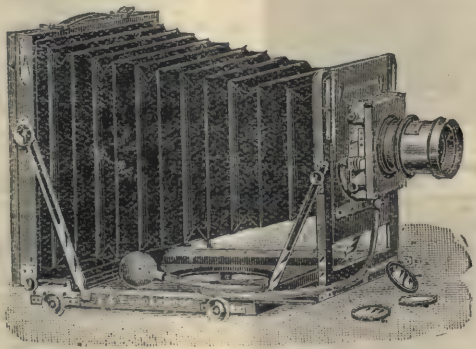
[*See preceding and following pages.*

Patentees and Manufacturers,

The 'SALON,' (Registered.)

PATENT.

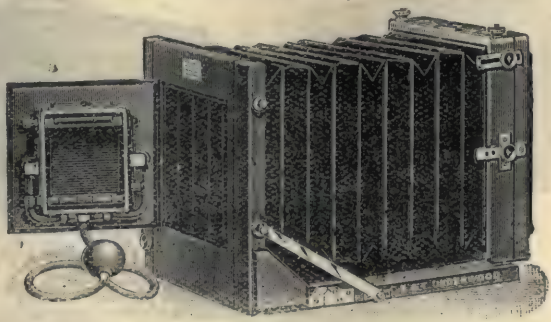
THE NEW HIGH-CLASS CAMERA.



Specially designed for the requirements of PICTORIAL . . . PHOTOGRAPHY, and equally adapted for Technical Work of the highest excellence.

A NEW HIGH-CLASS CAMERA.

The 'ROYAL,' (Registered.)



For particulars see Full Illustrated Catalogue, Three Stamps.

BIRMINGHAM.

See preceding and following pages.

E. & T. UNDERWOOD.



THE 'IDLER.'

(PATENT.)

First Quality Hand Camera.

Carrying Twelve ¼-plates.
Special Rapid high-class Rectilinear Euryscope Lens.
Instantaneous and Time Shutter working in the Diaphragm Plane.
New Patent 'Absolute' Indicator.
Two Accurate Finders.
Covered in best Morocco Leather.
Best quality, design, and Finish.

PRICE, complete, **£5.**

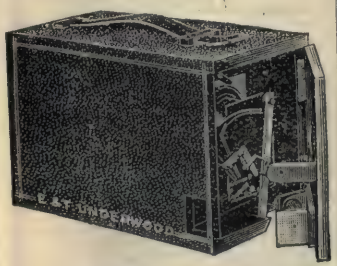


THE 'SPHYNX.'

Magazine Hand Camera for twelve ¼-plates.

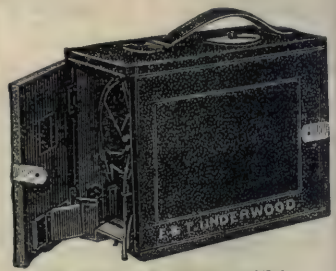
Highest quality Euryscope Lens, with Iris Diaphragms. Time and Instantaneous roller blind shutter working between lenses. Horizontal and Vertical Finders, focussing from 5 ft. to infinity. Covered in best morocco leather, handsomely finished.

Size $9\frac{3}{4} \times 5\frac{1}{4} \times 4\frac{1}{4}$, **£3 15s.**



THE 'CITY.'

Twelve ¼-plates **£1 10 0**



THE 'AUTOMAT.'

Twelve ¼-plates **£2 0 0**

Full particulars see ILLUSTRATED CATALOGUE.

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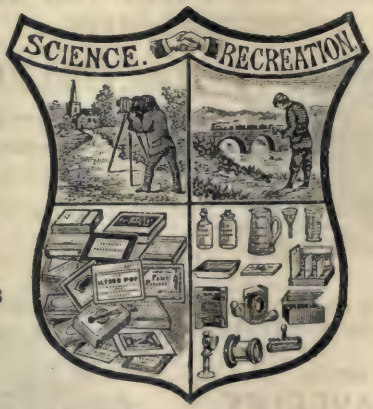
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Catalogues with Hundreds of Illustrations Post Free.

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For the CELEBRATED MAKERS of

CAMERAS,

PLATES, FILMS,

AT LOWEST - - - - - CASH PRICES.

P.O.P., &c.

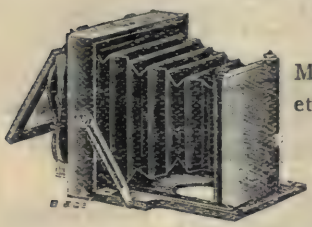
Immense Stock of Accessories kept.

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THE GREAT CITY DEPOT FOR AMATEUR PHOTOGRAPHERS.



The 1898 'AJAX.'

Made of Polished Mahogany, Leatherette Bellows, Reversing Back, very portable and strongly made.

¼-Plate Camera (only), with 1 Double Slide ... ... **12/6** net.
½-Plate, do. do. ... ... **20/-** ,,

FOR PRICES OF ALL THE POPULAR MAKERS' LENSES, SEE CATALOGUE, POST FREE.

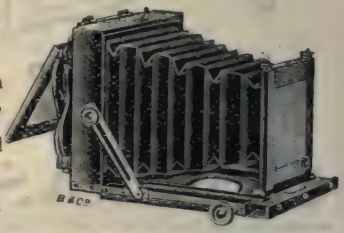
— THE —

1898 'WAVERLEY.'

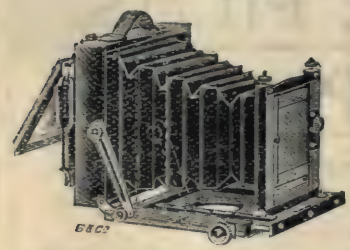
Polished Mahogany Camera, with Double Extension Leather Bellows, Swing Back, Reversing Back.

Rack and Pinion Focussing, and all the latest movements.

¼-Plate Camera (only), with 3 Double Dark Slides ... **30/**: net
½-plate, do. do. ... ... **47/6** ,,



CATALOGUES POST FREE.



— THE —

1898 'PICKWICK.'

Polished Walnut, Wide Angle Movement, Double Extension Leather Bellows, Swing Back, Reversing Back, Rack and Pinion Focussing, and all the latest movements.

¼-Plate Camera (only), with 1 Double Dark Slide... ... **37/6** net
½-Plate, do. do. ... ... **48/-** ,,

89, 90, 107 and 108 Cheapside, London, E.C.

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BENETFINK & Co.

THE GREAT CITY DEPOT FOR AMATEUR PHOTOGRAPHERS.

BENETFINK'S

1898 'Ajax' Camera Set.



Including Camera as described on previous page, with Single Achromatic Lens of good quality, one Double Dark Slide, and Folding Tripod Stand.

¼-plate size ... ... **20/-** net.
½ ,, ... **31/6** ,,

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— BENETFINK'S —

1898 R.R. 'Pickwick' Camera Set

Including Camera as described on previous page, fitted with R. R. Lens and Thornton-Pickard Time and Instantaneous Shutter, Iris Diaphragm working at an aperture of F/8, complete with one Double Dark Slide, and 3-Fold Stand with Sliding Legs.

¼-pl. size, **73/6** net. ½-pl. size, **96/-** net.

If fitted with Single Achromatic Lens and Time and Instantaneous Shutter, instead of R. R. Lens and Thornton-Pickard Shutter, ¼-pl. size, **53/6** net. ½-pl. size, **75/-** net.

BENETFINK'S

1898 'Waverley' Camera Set



Including Camera as described on previous page, fitted with Single Achromatic Lens which has Rotating Diaphragms, and a Time and Instantaneous Shutter. The Lens is a rapid one and of good quality. Three Double Dark Slides and a Folding Tripod Stand are supplied with this set.

¼-plate size ... ... **42/-** net.
½ ,, ... **66/-** ,,

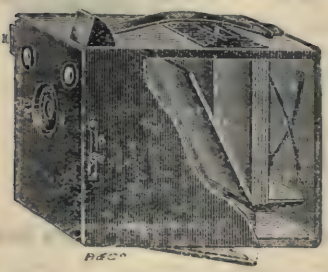
86, 90, 107 and 108 Cheapside, London, E.C.

[*See preceding and following pages.*

BENETFINK'S

Hand Cameras.

The No. 1 'Lightning' Hand Camera.



1898 MODEL.

To carry 12 Plates. Automatic Changing as shown in illustration. Fitted with good quality single Achromatic Lens.

¼-Plate size, net 42/-
,, ,, R. R. Lens, net ... 68/6

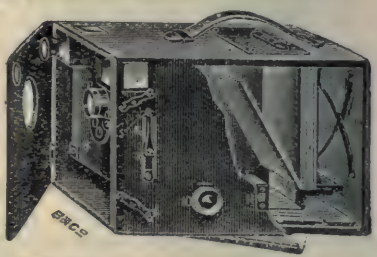
A facsimile of this label is on each of our genuine 'Lightning' Cameras.



Full Particulars and Specimen Print free on application.

The No. 2 'Lightning' Hand Camera.

We have introduced for those who require a rackwork focussing adjustment, the changing of plates, &c., being the same as in the other models. The focussing scale is marked for 5, 8, 12, 16, and 22 feet; it is also adapted for use on tripod, and is very portable and strongly made.



The 1898 Focussing No. 2 'Lightning' Hand Camera

Carries 12 ¼-Plates, Automatic Changing, fitted with R. R. Lens, &c., 88/- net.

CATALOGUES POST FREE.

89, 90, 107 and 108 Cheapside, London, E.C.

[*See preceding and following pages.*

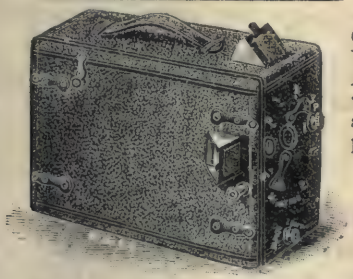
BENETFINK'S

Hand Cameras.

The 'SPEEDY' HAND CAMERA

A Facsimile of this Label is on each of our Genuine 'Speedy' Cameras.





Carries 12 Plates. Fitted with two View Finders with covered Hoods, Automatic Changing, and Indicator which is reliable and easy. Time and Instantaneous Shutter. Complete with Magnifiers for taking portraits or near objects.

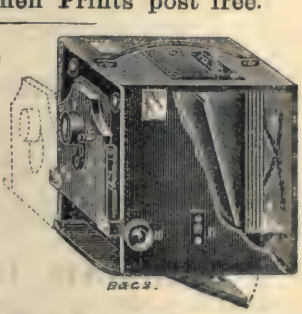
¼-Plate size, with Single Lens,
£2 12 6

Ditto, with R. R. Lens,
£4 10 0

Full Particulars and Specimen Prints post free.

The No. 3 'Lightning' Camera

Is specially recommended for Cyclists, being very portable, and adapted for carrying on machine. It carries 12 ¼-plates, automatic changing, focussing rack, 2 view finders, and all the necessary movements.



The No. 3 'Cyclist' Lightning Hand Camera.

Price, fitted with R. R. Lens, &c., net, **85/-** complete in leather case.

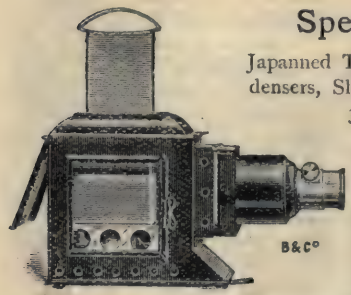
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BENETFINK'S

Lecturer's Lanterns



Special Cheap Line.

Japanned Tin Lantern, fitted with 4-inch Condensers, Sliding Tube, Rackwork Lens, and 3-wick Lamp for Burning Petroleum,
Net, **18/-**

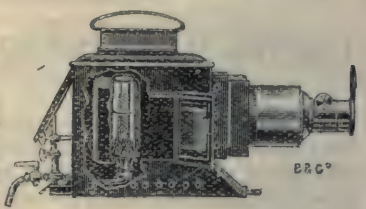
If fitted with 4-wick Lamp and Flasher to Lens, and packed in Carrying Case,
Net, **22/6**

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All Lanterns on this page take full-size Slides, $3\frac{1}{4} \times 3\frac{1}{4}$.

New Pattern Japanned Tin Lantern.

With 4-in. Condensers, Sliding Front, good quality Projection Lens, with Flasher and Rack and Pinion Focussing, 4-wick Lamp for burning Petroleum, packed complete in neat Metal Case. Net, **25/6**



RUSSIAN IRON LANTERN.

Adapted for use with Incandescent Gas, 4-inch Condensers, Brass Sliding Front, good quality Projection Lens, with Flasher and Rack and Pinion Focussing.
Price, Complete in Metal Case, containing Burner with Mantle and Talc Chimney, Gas Jet and Tray, Reflector and Special Top as illustration,
Net, **38/6**

89, 90, 107 and 108 Cheapside, London, E.C.

[*See preceding and following pages.*

BENETFINK & CO.,

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CHEAPSIDE, LONDON, E.C.

[*See preceding pages.*

JAMES LANCASTER & SON, Opticians

BIRMINGHAM.

SEASON 1898.

MESSRS. J. L. & S. *have to thank their numerous customers for the ever growing confidence bestowed upon them.*

They are determined to do all in their power to keep up their world-wide reputation.

Their sales during last twelve years have been 200,000 *Cameras and* 275,000 *Lenses.*

INDEX.

CAMERA SETS	432-447
CAMERA STANDS	448-449
LENSES	450-453
SHUTTERS	454-455
HAND CAMERAS	456-462
SUNDRIES	463-476
ENLARGING APPARATUS	477-480
OPTICAL LANTERNS ...	481-494
LANTERN SLIDES	493-494

Fully Illustrated and Descriptive Catalogue, four stamps. Abridged Catalogues Free.

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[*See following pages.*

J. LANCASTER & SON, OPTICIANS,

1898. 1898.

CATALOGUE

OF

Photographic Apparatus.

MESSRS. J. LANCASTER & SON

HAVE MUCH PLEASURE AND GRATIFICATION IN ACKNOWLEDGING
. . . . . THE SALE UP TO DATE OF . . . . .

Over 200,000 Cameras

AND

275,000 Lenses.

THESE have been sold upon their merits alone; not a single Testimonial has ever been printed, nor a press puff ever paid for, but that invaluable "aid to commerce," a kindly recommendation from friend to friend, has produced a demand which exceeds **20,000** Cameras per annum.



Their Registered Trade Mark is put on every Camera, Lens, Slide, &c., sent out by them, and Buyers should reject any article not marked.

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COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

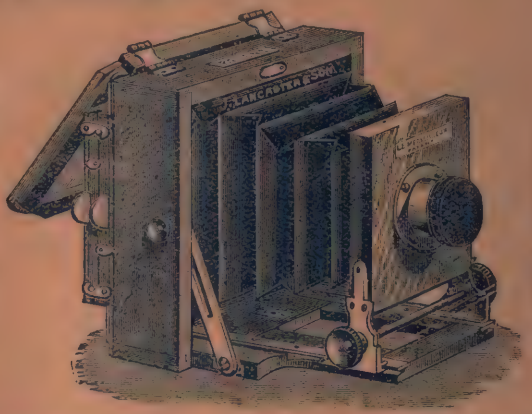
THE 1898

"LE MERVEILLEUX"

(PATENT).

THIS is a capital Camera, made of mahogany, well framed together, with a bellows body, which makes the Camera very portable. The Focussing Slide is hinged, and folds over on to the top of Camera when dark slide is in the Camera. The slide reverses in an instant, so that a vertical or horizontal photo can be taken without moving any part of the Camera.

Light, Strong, Durable.
A most Compact Apparatus.



No Loose Parts.
Opened and Closed in an instant.

Each Set consists of Camera, Double Dry Slide, Lens and Stand.

300	"Le Merveilleux," for ½ plate ...	...	...	...	...	£1	1	0
302	,, ,, ,, ½ ,, ...	...	...	...	...	■	2	0
304	,, ,, ,, ¼ ,, ...	...	...	...	...	3	3	0
305	,, ,, ,, 10×8 plate	...	...	...	...	4	4	0
306	,, ,, ,, 12×10 plate	...	...	...	...	5	5	0
307	,, ,, ,, 15×12 plate	...	...	...	...	6	6	0

EXTRA SLIDES.

		½	½	¼	10×8	12×10	15×12
308	Double Dry Slides	5/6	10/3	18/-	25/-	35/-	40/-
309	Wet Plate ,, ...	5/-	10/-	16/-	21/-	30/-	35/-
	Carriers	—	1/3	2/6	3/-	3/6	4/-

The Carriers hold two plates, thus the ½ plate Carrier at 1/6 holds two ¼ plates, the ¼ plate holds two ½ plates, and so on.

When ordering Carriers for large Cameras it is best to have them nested thus: two Carriers for the ¼ plate Camera, if each Carrier fits the slide cost 5/-, but having one Carrier to take ½ plates and fit ¼ plate slide, and then a ¼ Carrier to go in ½ plate, the cost will be 2/6 and 1/6, or 4/-.

COLMORE ROW, BIRMINGHAM.

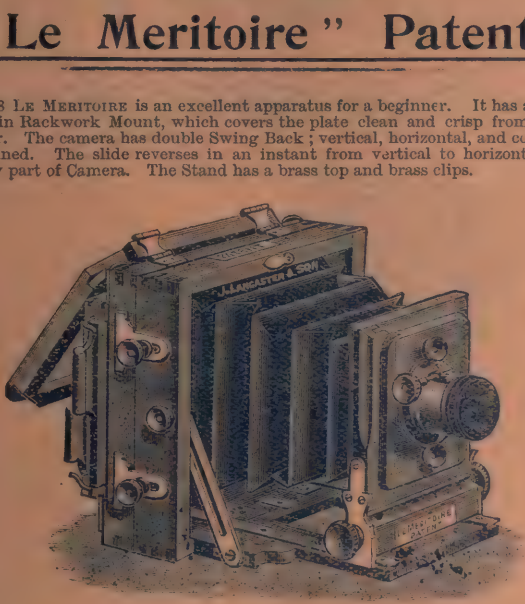
J. LANCASTER & SON, Opticians,

THE 1898

"Le Meritoire" Patent.

THE 1898 LE MERITOIRE is an excellent apparatus for a beginner. It has a very good Lens in Rackwork Mount, which covers the plate clean and crisp from corner to corner. The camera has double Swing Back; vertical, horizontal, and corner swing being obtained. The slide reverses in an instant from vertical to horizontal without moving any part of Camera. The Stand has a brass top and brass clips.

DOUBLE SWING.
PATENT UNIVERSAL FRONT.



VERY LIGHT AND PORTABLE.
NO LOOSE PARTS.

THE Swing Back is most essential when the Camera is required for Architectural work, and also the Rising Fronts are indispensable for the same kind of work—in fact, it is impossible to get true Architectural line unless we have both the Swing Back and Rising Front.

EACH SET CONSISTS OF CAMERA, DOUBLE DRY SLIDE, LENS AND STAND.

310	"Le Meritoire" for ¼ plates	£1	11	6
312	" " " ½ "	3	3	0
314	" " " ¼ "	4	10	0
315	" " " 10 × 8 plates	6	0	0
316	" " " 12 × 10 "	7	10	0
317	" " " 15 × 12 "	8	10	0

	¼	½	¼	½	¾	¼	½
Camera and Double Dry Slide only	21/-	42/-	63/-	84/-	100/-	100/-	120/-
Stand only	5/-	7/6	10/6	12/6	15/-	15/-	17/6
Double Dry Slides	5/6	10/6	15/-	25/-	35/-	40/-	
Carriers		1/6	2/6	3/-	3/6	4/-	

COLMORE ROW, BIRMINGHAM.

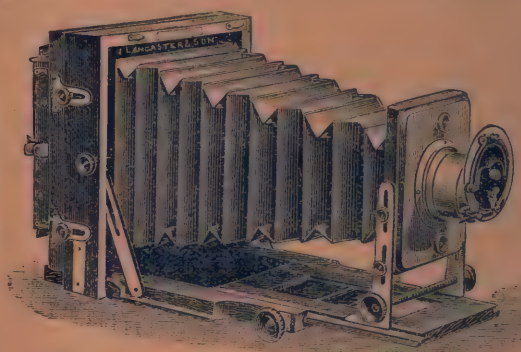
J. LANCASTER & SON, Opticians,

THE 1898

"INSTANTOGRAPH" PATENT.

THIS Apparatus is useful for all kinds of work—Instantaneous Pictures, Portraits, Groups, Landscapes, Architectural and Engineering Subjects, etc., etc. The Lens is a most rapid type, and has a Patent Instantaneous Shutter working with the greatest rapidity; also our Patent Adjustable Diaphragms, showing at a glance the precise aperture by a divided scale, and the relative times of exposure with different apertures.

Universal Opinion:



Everything an Amateur can desire.

Will take Vertical or Horizontal Photos.

The Camera is beautifully made and folds up into the smallest possible compass. The Tail Board opens out of Camera, and the Lens Front slides out and clamps. Fine Adjustment is obtained by Rackwork. The Bellows in the **Instantograph** are made of Leather, and the Apparatus—of which, by the way, over 90,000 have been sold—is pronounced the *sine qua non* of the Amateur Photographer. The Stand is of polished mahogany, with a brass top.

Each Set consists of Camera, Slide, Lens, Shutter, and Stand.

320	Price complete, for ¼ plate	**£2**	**2**	**0**
322	,, ,, ½ ,, ...	**4**	**4**	**0**
324	,, ,, ¼ ,, ...	**6**	**6**	**0**
325	,, ,, 10×8 plate	**8**	**8**	**0**
326	,, ,, 12×10 ,, ...	**10**	**10**	**0**
327	,, ,, 15×12 ,, ...	**12**	**12**	**0**

Extra Slides.

		¼	½	¼	10×8	12×10	15×12
328	Double Dry Slides...	**7/6**	**12/6**	**20/-**	**28/-**	**40/-**	**45/-**
329	Wet Plates	**6/-**	**11/-**	**17/6**	**24/-**	**34/-**	**38/-**
	Carriers	—	**1/6**	**2/6**	**3/-**	**3/6**	**4/-**

The Carriers hold two plates, thus the ½ plate Carrier at 1/6 holds two ¼ plates, the ¼ plate holds two ⅛ plates, and so on, but Carriers may be had for any of the smaller sized Plates, at the above prices.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

"Instantograph" Complete Outfit.



Complete Outfits (C)

FOR NEGATIVES, PRINTS, Etc.

THESE Sets consist of the Camera, Lens, Stand, three Double Dry Slides, two dozen plates, Ruby Lamp, six Dishes, Printing Frames, Scales and Weights, Sensitised Paper, large stock of Chemicals, Vignette and Cutting Glasses, Measures, Plate Box, Compound Focusser, etc., in Polished Cabinets.

320c	Complete Outfit,	¼ plate	...	...	..	£4	4	0
322c	,,	½ ,,	...	...	...	7	7	0
324c	,,	¼ ,,	...	...	...	10	10	0
325c	,,	10×8	...	...	...	14	14	0
326c	,,	12×10	...	...	...	20	0	0

If with Rectigraph Lens and See-Saw Shutter, in place of Instantaneous Lens and Shutter—Extra Cost:

¼	½	¼	10×8	12×10	15×12
£1 2 6	£1 17 6	£2 7 6	£2 17 6	£3 15 0	£4 10 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

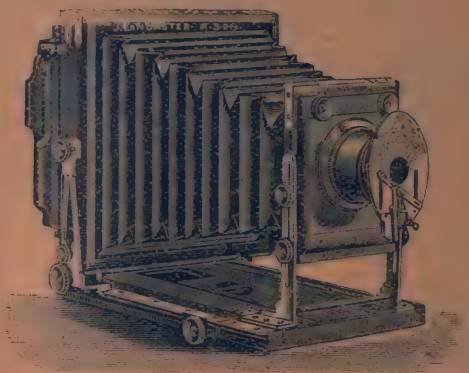
THE 1898

SPECIAL BRASS-BOUND INSTANTOGRAPH.

(PATENT).

THIS is a New Camera made to meet the wishes of a number of Amateurs who have asked for a high-class Camera, Brass Bound, with Double Swing and Folding Tail-board closing over and protecting focussing glass when carrying.

Very Compact.



Double Swing.

Light and Strong.

Long Extension

The Special Instantograph fulfils all these, and even more conditions. The Camera is of the best quality and finish, Brass Bound, Double Swing, Folding Tail-board, Patent Bellows, square and taper, best Lens, with Patent See-saw Shutter.

Each Set consists of Camera, Slide, Lens, Shutter, and Stand.

S 320	Price complete, for ¼ plate	£2	10 0
,, 322	,, ,, ,, ½ ,, ...	5	0 0
,, 324	,, ,, ,, 1 ,, ...	7	10 0
,, 325	,, ,, ,, 10×8 plate	9	9 0
,, 326	,, ,, ,, 12×10 ,, ...	11	11 0
,, 327	,, ,, ,, 15×12 ,, ...	13	13 0

With Rectigraph Lens and See-saw Shutter in place of Instantograph Lens and Shutter.

¼	½	1	10×8	12×10	15×12
£3 12 6	£6 17 6	£9 17 6	£12 6 6	£15 6 0	£18 8 0

Extra Slides, Brass Bound.

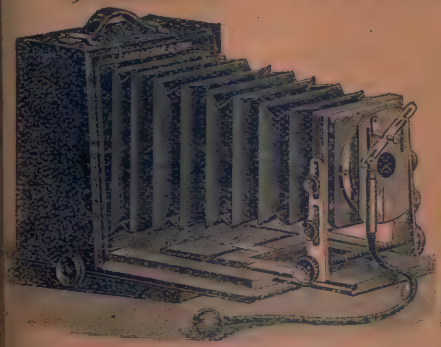
¼	½	1	10×8	12×10	15×12
9/6	14/6	23/-	30/-	42/-	50/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

..THE.. 1898 FOLDING

"INSTANTOGRAPH"



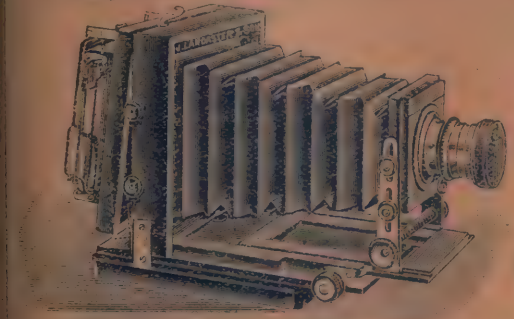
OPEN.

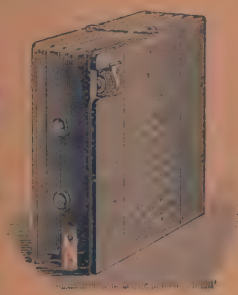


CLOSED.

The 1898 Folding Instantograph has Double Swing Back, Rising Front, Best Lens, See-Saw Shutter, and Portable Stand.

The Camera is made of Mahogany and polished, as in woodcut below, or covered in Best Leather as above. Both forms close into the smallest possible compass, and although light, are very strong and durable.





COMPLETE SETS. Camera, Lens, Shutter, Slide, and Stand.

¼ ... £2 2 0 ½ ... £4 4 0 ¼ ... £6 6 0

Extra Slides ... ¼ ... 7/6 ½ ... 12/6 ¼ ... £1 0 0

COMPLETE SETS. For Negatives and Prints.

Sets including Camera, Lens, Shutter, Slide and Stand, and a good supply of Chemicals, Plates, Sensitised Paper, Printing Frame, &c., &c.

¼ ... £2 13 6 ½ ... £5 7 0 ¼ ... £8 1 0

If with Rectigraph Lens and See-Saw Shutter in place of Instantaneous Lens and Shutter, Extra.

¼ ... £1 2 6 ½ ... £1 17 6 ¼ ... £2 7 6

COLMORE ROW, BIRMINGHAM.

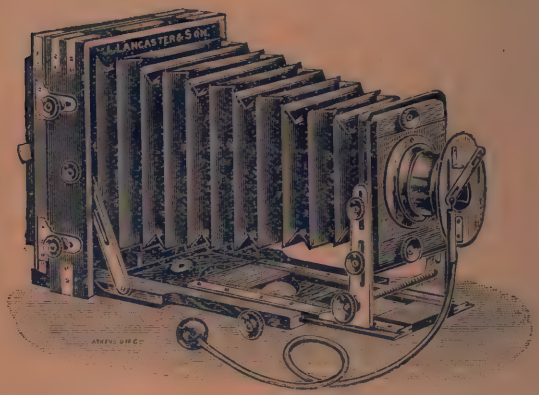
J. LANCASTER & SON, Opticians,

The 1898

Aluminium Mounted "INSTANTOGRAPH"

This Apparatus is about as Perfect, Portable and Light as it is possible to make one.

The Amateur's Delight



and Constant Companion.

This Camera is made out of selected Mahogany, and is of the smallest possible size, with a due regard to strength. It has Aluminium Binding, Aluminium Front Stage, Plates, Screws, &c., so that the Camera is the Lightest ever made. It has Rising Front, Double Swing Back, Long Extension, Reversing Back, and all recent improvements.

The Lens is a specially selected one, mounted in Aluminium, and has our Patent Aluminium See-Saw Shutter.

The Stand has an Aluminium Top, and the whole apparatus is perfect and complete.

—:o:—

	¼	½	½	10×8	12×10
Camera, Slide, Lens, Shutter and Stand ...	£3 3 0	£5 10 0	£8 0 0	£10 10 0	£12 12 0
Extra Slides, Aluminium Bound	0 10 0	0 15 0	1 5 0	1 15 0	2 5 0
Sets of Chemicals for Negatives & Prints, &c.	0 11 6	1 5 0	1 15 0	2 10 0	3 3 0

—:o:—

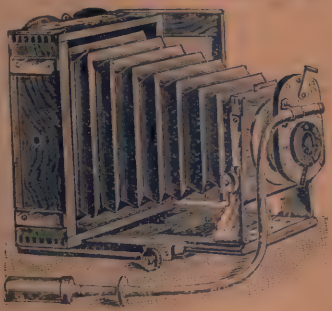
If with Aluminium Rectigraph and Aluminium See-Saw Shutter, in place of Instantograph Lens, Extra Cost.

¼ ... £1 10 0 ½ ... £2 10 0 1 ... £3 10 0

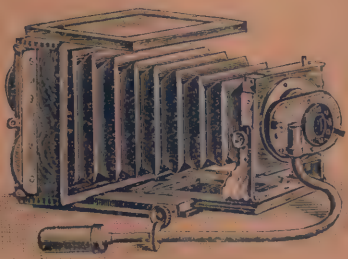
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

NOVELTY FOR 1898.



VERTICAL.



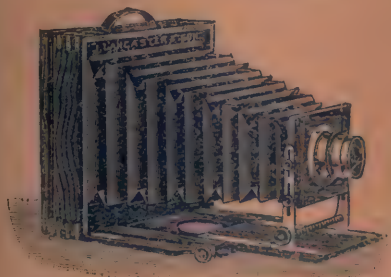
HORIZONTAL.

THE "CYCLO INSTANTOGRAPH" (Patent).

The **"Cyclo Instantograph,"** with Instantaneous Lens, best Shutter, Stand, etc., and Leather-bound Case, 3 Double Metal Slides:—¼ plate, **£2 2s.**
Ditto, ditto, with Rectigraph Lens, etc., etc. :—¼ plate, **£3 3s.**

"POCKET INSTANTOGRAPH" (Patent).

MOUNTED IN ALUMINIUM.





THIS is a portable form of Instantograph, excessively light; it has Aluminium Binding, Runners, Front Stage, etc.
The Lens is very rapid and is mounted in Aluminium, and Patent Aluminium Shutter.
The Stand is a new pattern, with Aluminium Top and Fittings.
The Camera, Lens, Shutter, and three Double Dry Slides are carried in a Leather Case, with lock and key, and form altogether a most beautiful set.
The Double Slides ¼ plate weigh two ounces each, and three are included in each set.

	¼	½	¾
Pocket Instantograph, including Camera, Lens, Shutter, three Aluminium bound Slides, Leather Case, and Aluminium Mounted Stand ...	**84/-**	**147/-**	**200/-**
Ditto, ditto, with Rectigraph Lens, mounted in Aluminium	**110/-**	**200/-**	**270/-**

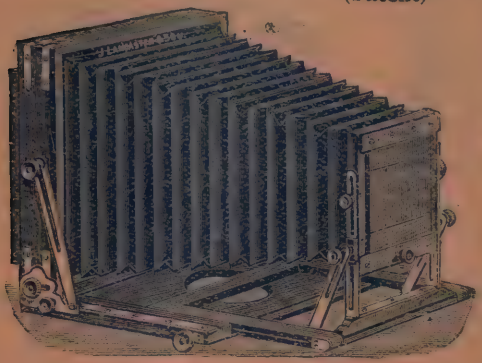
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J. LANCASTER & SON, Opticians,

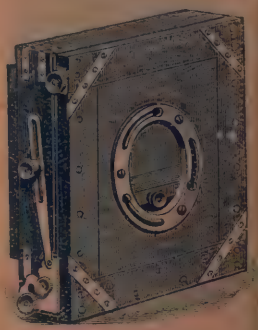
THE 1898

"Imperial Instantograph"

(Patent)



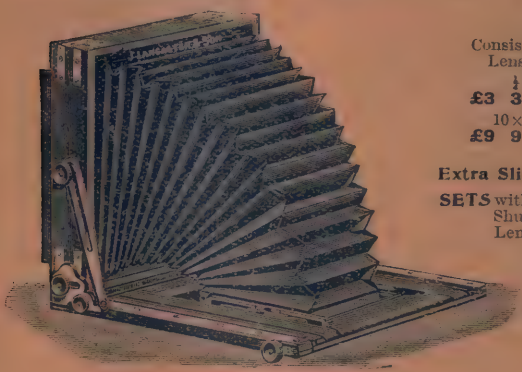
OPEN.



FOLDED

THIS is a New Camera of great strength, portability, and lightness. It unfolds and folds with the utmost rapidity, and has Double Swing Back, Rising and Cross Front, Long Extension Camera, with one Double Slide.

	10×8	12×10	15×12
PRICES—	**£1 17½ 6** **£3 10½ 0** **£5 0½ 0**	**£6 0 0**	**£7 0 0**	**£8 0 0**



SETS,

Consisting of Camera, Instantaneous Lens, Shutter, Slide, and Stand.

	10×8	12×10	15×12
	£3 3½ 0 **£6 6½ 0** **£7 10½ 0**	**£9 9 0**	**£12 0 0**	**£14 14 0**

Extra Slides—9/6 14/6 £1 3½ 0 each.

SETS with Rectigraph Lens and See-Saw Shutter, in place of Instantograph Lens and Shutter—

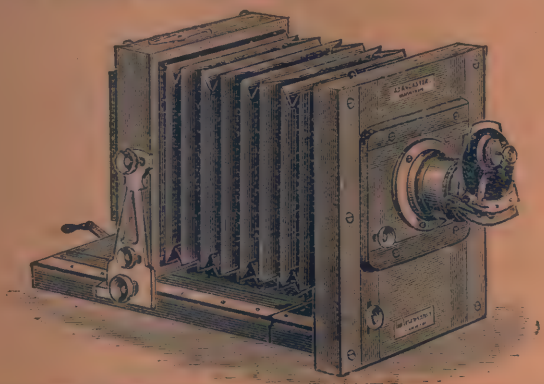
	10×8	12×10	15×12
	£4 5½ 6 **£7 7½ 6** **£9 17½ 6**	**£12 6 6**	**£15 6 0**	**£18 8 0**

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

The 1898 "International" Patent.

THIS is an excellent Apparatus, very compact, opening out to nearly three times the greatest length of Plate. It has a folding Tail-board, Patent Reversing Frame and Slide Holder, Double Swing, Rising and Cross Fronts, &c. The Lens is an Instantaneous one, with Patent Shutter and Patent Diaphragms, giving any aperture that may be required, and showing at a glance the diameter of Stop, ratio of aperture to focus, and speed of same. Mahogany Stand with Brass Top.



The INTERNATIONAL is a Camera which has given great satisfaction; it is strongly built, well put together, and in every way is a perfect Apparatus.

330	Price Complete	... ...	¼ (4¼×3¼)	**£2**	**10**	**0**
331	,, ,,	... ...	5×4	**4**	**0**	**0**
332	,, ,,	... ...	½ (6½×4¾)	**5**	**0**	**0**
333	,, ,,	... ...	7½×5	**6**	**6**	**0**
334	,, ,,	... ...	¼ (8½×6½)	**7**	**10**	**0**
335	,, ,,	... ...	10×8	**9**	**9**	**0**
336	,, ,,	... ...	12×10	**11**	**11**	**0**
337	,, ,,	... ...	15×12	**13**	**13**	**0**

330a	Fitted with Rectigraph Lens and New Patent Shutter, in place of Instantaneous Lens and Shutter		¼ (4¼×3¼)	**£3**	**12**	**6**
331a	Ditto	ditto ditto	5×4	**5**	**10**	**0**
332a	Ditto	ditto ditto	½ (6½×4¾)	**6**	**17**	**6**
333a	Ditto	ditto ditto	7½×5	**8**	**8**	**0**
334a	Ditto	ditto ditto	¼ (8½×6½)	**9**	**17**	**6**
335a	Ditto	ditto ditto	10×8	**12**	**5**	**0**
336a	Ditto	ditto ditto	12×10	**15**	**0**	**0**
337a	Ditto	ditto ditto	15×12	**17**	**10**	**0**

COLMORE ROW, BIRMINGHAM.

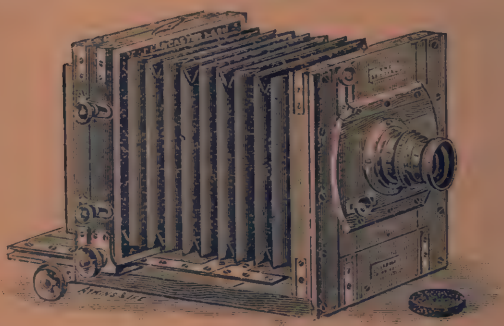
J. LANCASTER & SON, Opticians,

LANCASTER'S

"IMPROVED SPECIAL '86" CAMERA.

(Patent).

Double Extension, very Portable.



Brass-Bound, Double Swing, Ring and Cross Front.

BEST Quality Brass-Bound Folding Camera, extending to twice the ordinary length with Rackwork Adjustment, best Leather Bellows, Reversing Frame, Rising Fronts. The Focussing Slide moves in a Lateral direction, and the Dark Slide, instead of sliding in the usual way, is simply grooved to go on to a brass plate, and a movable plate in back of Camera fixes the Dark Slide in an instant.

EACH CAMERA HAS DOUBLE SWING.

Camera and One Brass-bound Slide.

338	339	340	341	342	343
¼	½	¼	10×8	12×10	15×12
£2 10 0	£4 0 0	£5 0 0	£6 0 0	£7 0 0	£8 0 0

Extra Dark Slides.

	¼	½	¼	10×8	12×10	15×12
Double Dry	12/6	17/6	25/-	30/-	42/-	50/-
Wet	10/-	15/-	21/-	25/-	40/-	45/-
Carriers	—	1/6	2/6	3/-	3/6	4/-

FIRST QUALITY SETS.

LANCASTER'S Special '86 Camera, Brass-bound, Double Dry Slide, Instantaneous Lens with Patent Adjustable Diaphragms, Instantaneous Shutter, and best Mahogany Folding Stand, etc.

338a	339a	340a	341a	342a
¼	½	¼	10×8	12×10
£4 0 0	£6 0 0	£8 0 0	£10 0 0	£12 12 0

LANCASTER'S PATENT CAMERA, etc., etc., as above, but having Rectigraph Lens, and Lancaster's Patent "See-saw" Shutter in place of Instantaneous Lens and Shutter. This is a perfect Camera and Lens.

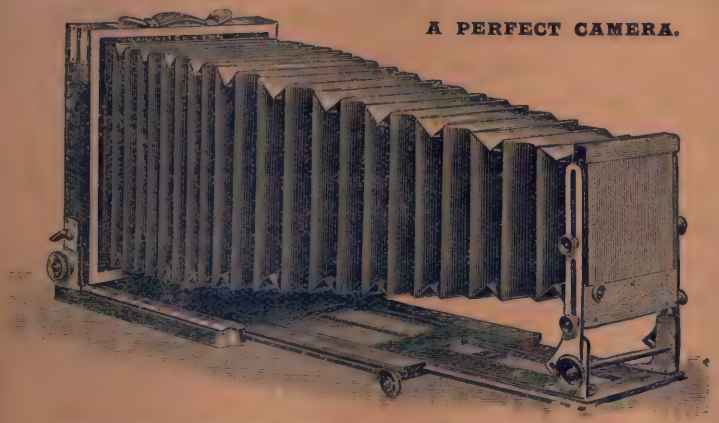
338b	339b	340b	341b	342b
¼	½	¼	10×8	12×10
£5 0 0	£7 10 0	£10 0 0	£12 12 0	£15 0 0

BRITISH **COLMORE ROW, BIRMINGHAM.**

J. LANCASTER & SON, Opticians,

Lancaster's 'Extra Special' Camera.

A PERFECT CAMERA.



These are the Lightest, Longest and most Compact in the market.

THE "EXTRA SPECIAL" opens out to three times the length of plate, and closes to about two inches. It has Rack and Screw Adjustment; the Rack Adjustment commencing when Camera is closed, and racks out to double extension, then the Screw Adjustment extends Camera to triple extension, giving fifty per cent. more extension than any other Camera extant.

Double Swing Back, Swing Front, Reversing Back, No Hinges, Focussing Glass Protected, &c.; Camera and Double Dry Slide.

¼	½	1/1	10×8	12×10	15×12
£2 10 0	£4 0 0	£5 5 0	£6 10 0	£7 10 0	£8 15 0

Extra Slides, Brass Bound.

	¼	½	1/1	10×8	12×10	15×12
Double Dry	12/6	17/6	£1 5 0	£1 10 0	£2 2 0	£2 10 0
Carriers ...	—	1/6	2/6	3/-	3/6	4/-

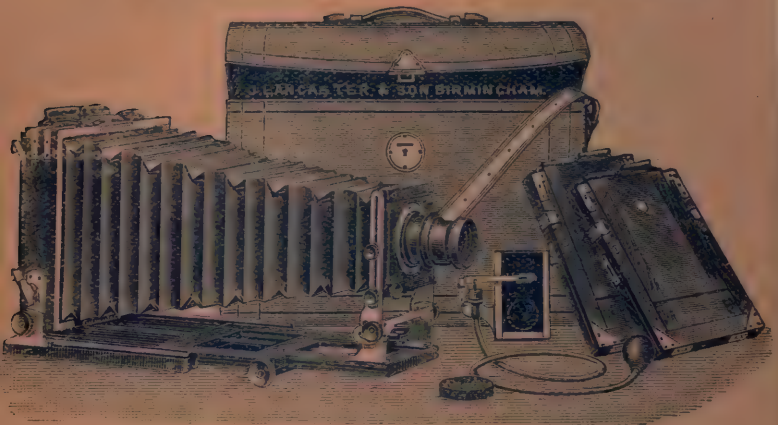
This Camera can be used with the shortest Wide Angle Lens, and will extend sufficiently far to be used even as an Enlarging Camera.

IT HAS GIVEN UNIVERSAL SATISFACTION

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

First Quality Sets.



Lancaster's Extra Special Patent Camera, Brass-bound, Double Dry Slide Instantaneous Lens, with Patent Adjustable Diaphragms, Instantaneous Shutter, and Best Mahogany Folding Stand, Leather-bound Case to carry Camera, Lens, and Slide, etc.

¼	½	¼	10×8	12×10	15×12
Ex. S. A.	Ex. S. A.	Ex. S. A.	Ex. S. A.	Ex. S. A.	Ex. S. A.
£4 4 0	**£6 6 0**	**£8 8 0**	**£10 10 0**	**£12 12 0**	**£14 14 0**

Lancaster's Patent Camera, &c., &c., as above, but having Rectigraph Lens and Lancaster's Patent See-Saw Shutter in place of Instantaneous Lens and Shutter. This is a perfect Camera and Lens.

¼	½	¼	10×8	12×10	15×12
Ex. S. B.	Ex. S. B.	Ex. S. B.	Ex. S. B.	Ex. S. B.	Ex. S. B.
£5 5 0	**£7 17 6**	**£10 5 0**	**£12 15 0**	**£15 0 0**	**£18 0 0**

First Quality Complete Sets,

INCLUDING :—

Lancaster's Extra Special Patent Camera, three Brass-bound Double Dry Slides, best Camera Stand, Rectigraph Lens, best Leather Case for Camera, Lens, Instantaneous Shutter and three Slides, Lancaster's Patent Ruby Lamp, three Ebonite Dishes, Plates, Scales and Weights, Measures, Vignette Glass, Printing Frame, Cutting Shapes, Light-tight Plate Box, Compound Focusser, Sensitised Paper, and large stock of Chemicals in Stoppered Bottles, etc.

¼	½	¼	10×8	12×10	15×11
Ex. S. C.	Ex. S. C.	Ex. S. C.	Ex. S. C.	Ex. S. C.	Ex. S. C.
£8 8 0	**£12 12 0**	**£16 16 0**	**£21 0 0**	**£25 0 0**	**£30 0 0**

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

THE 1898 MODEL

"LADIES'" CAMERA

(PATENT)

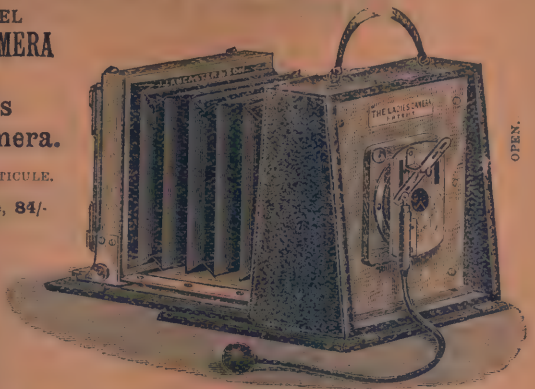
Lancaster's "Ladies'" Camera.

(PATENT)
Folding up like a RETICULE.

¼-plate, **42/-** ½-plate, **84/-**
¾-plate, **126/-**

Consists of Camera, Double Dry Slide, Lens, Shutter and Stand.

Extra Slides, ¼, **7/6**; ½, **12/6**; ¾, **20/-**



OPEN.





CLOSED

THIS APPARATUS has been specially designed for Ladies. It is entirely free from complications, and, although strong, yet is extremely light and portable.

The Apparatus consists of an excellent Portable Camera, with Folding Tailboard, Patent Reversible Back, changing from vertical to horizontal in an instant, thus enabling a vertical or horizontal photo to be taken at will without moving the Camera, Rising Front, &c., excellent Achromatic Lens with Iris diaphragms for Portraits, Groups and Views, Triple Folding Stand, &c., &c., making the most portable and complete Apparatus a lady can possibly have.

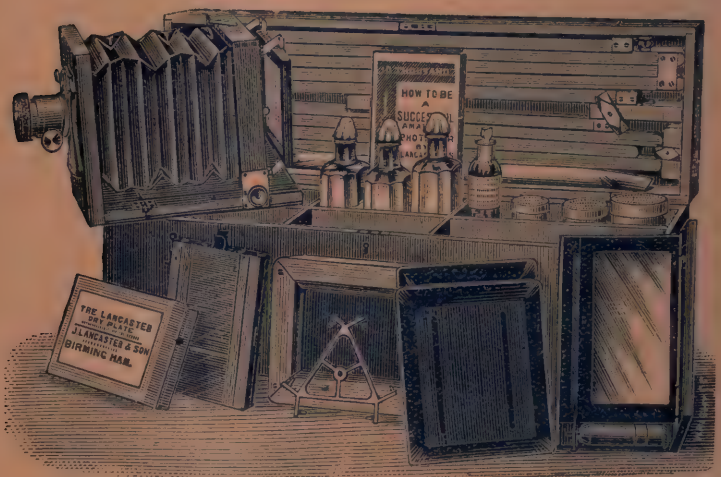
There are no loose parts, and the whole Apparatus is most easily opened and used, For Ladies it is an admirable Apparatus.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

THE

"Amateur's" Camera.



THE AMATEUR'S COMPLETE OUTFIT consists of Mahogany Camera with Folding Tail-board and Patent Reversing Back, Best Lens, 3-fold Stand, Chemicals, Plates, Dishes, Patent Folding Ruby Lamp, Printing Frame, Sensitised Paper, Toning and Fixing Solutions, Cards, Cutting Shape, &c., &c., with book of Instructions in Polished Box with Lock and Key.

PRICES COMPLETE.

½ 4½×3½	½ 6½×4¾	¼ 8½×6½	10×8	12×10
£2 10 0	£4 4 0	£6 0 0	£7 10 0	£9 0 0

EXTRA SLIDES.

	½	¼	¼	10×8	12×10
Double Dry ...	5/6	10/6	18/-	25/-	35/-
Wet	5/-	10/-	16/-	21/-	30/-
Carriers	—	1/6	2/6	3/-	3/6

The Carriers hold two plates, and are sent out to hold the next size smaller plate; thus ½ plate Carrier at 1/6 holds two ¼ plates, the ¼ plate holds two ⅛ plates, and so on, but Carriers may be had for any of the smaller plates at the above prices.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

CAMERAS ONLY

Le Merveilleux Camera and one Double Slide.

See page 432.

354	¼	½	¼	10×8	12×10	15×12
Camera and Slide ...	14/-	28/-	42/-	56/-	70/-	84/-
Extra Slides	5/6	10/6	18/-	25/-	35/-	40/-

Le Meritoire Camera and Slide.

Page 433.

355	¼	½	¼	10×8	12×10	15×12
Camera and Slide ...	21/-	42/-	63/-	84/-	100/-	120/-
Extra Slides	5/6	10/6	18/-	25/-	35/-	40/-

The Instantograph Camera and Slide.

Page 434.

356	¼	½	¼	10×8	12×10	15×12
Camera and Slide ...	25/-	50/-	75/-	100/-	120/-	160/-
Extra Slides	7/6	12/6	20/-	28/-	40/-	45/-

The Special Brass-Bound Instantograph Camera & Slide

Page 436.

356 S B	¼	½	1	10×8	12×10	15×12
Camera and Slide ...	32/6	63/-	95/-	115/-	140/-	160/-
Extra Slides	9/6	14/6	23/-	30/-	42/-	50/-

The International Camera and Slide.

Page 441.

357	¼	½	¼	10×8	12×10	15×12
Camera and Slide ...	3 /6	63/-	95/-	115/-	140/-	165/-
Extra Slides	7/6	12/6	20/-	28/-	40/-	45/-

The Amateur's Camera.

Page 446.

358	¼	½	¼	10×8	12×10	15×12
Camera and Slide ...	22/6	42/-	63/-	84/-	100/-	120/-
Extra Slides	5/6	10/6	18/-	25/-	35/-	42/-

Sliding Body Wet Plate Camera.

359		½	½	¼	10×8	12×10
Camera and Slide ...	—	15/-	21/-	35/-	45/-	63/-
Extra Slides	—	6/6	10/6	16/-	21/-	25/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

CAMERA STANDS, &c.





365—Pillar Studio Stand. **368—Patent Universal Stand.**

Studio Camera Stands.	¼	½	1	10×8	12×10
365—Studio Stand	**10/6**	**15/-**	**21/-**	**25/-**	**30/-**
366—Studio Stand with Rack Adjustment	**21/-**	**25/-**	**30/-**	**42/-**	**52/6**
367—Lancaster's International Stand	**7/6**	**12/6**	**15/-**		

368—Lancaster's New Stand, with Patent Universally Adjusting Top, giving any position to Camera, and with Adjustable Legs.

¼, **10/6**; ½, **15/-**; 1, **21/-**; 10×8, **25/-**; 12×10, **30/-**; 15×12, **35/-**



WATERPROOF CASES FOR STANDS.

¼, **3/-**; ½, **4/-**; 1, **5/-**; 10×8, **6/-**; 12×10, **7/-**

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

Portable Camera Stands, &c.



Head Rests.



French Polished Head Rests to attach to Chair, with Adjusting Screws,
5/-

Ditto, with Universal Motions,
10/6

Iron Head Rests,
£1 10 0



369.—Lancaster's New Camera Stand may be used in any and every imaginable position.

¼	½	1	10×8	12×10
12/6	**15/-**	**17/6**	**21/-**	**25/-**

370.—The Ladies' Three Fold Stand This forms a most compact stand, folding into a little over half the usual size.

¼	½	1	10×8	12×10
6/6	**10/-**	**12/6**	**15/-**	**21/-**

370.—The Ladies' Three-fold Stand.



CASES FOR STANDS.

Leather-bound Cases, with Lining, to carry Stands in.

¼	½	1	10×8	12×10
3/-	**4/-**	**5/-**	**6/-**	**7/-**

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

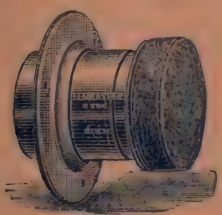
LENSES.

MESSRS. LANCASTER & SON again have pleasure in recording the fact that during the last fifteen years they have sold over 275,000 of their Lenses, and have received the most flattering testimonials from the highest in the Profession, and the most distinguished Amateurs.

MESSRS. LANCASTER & SON see that every Lens is stamped with engraved upon it in full. They and Crown, and do not send a Lens stringent testing. These remarks apply to all Lenses of their manufacture.



warn customers before purchasing, to their Trade Mark, or has their name carefully select only the Best Flint out unless it passes the most



No. 374.

LANDSCAPE LENSES.

Mounted in Brass with Sliding Tubes. The Lenses are of the Meniscus form, giving perfect definition from centre to margin.

Size	¼	½	1	10×8	12×10	15×12
Focus	5½in.	9in.	12in.	16in.	20in.	24in.
Price	**5/-**	**10/-**	**15/-**	**20/-**	**25/-**	**30/-**



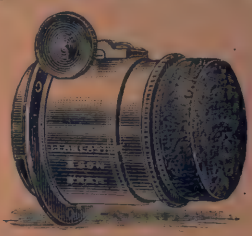
No. 376 N.A.

NARROW ANGLE LENS.

(Patent.)

This is an excellent Lens for Narrow Angle Work, giving superb definition.

Size	¼	½	1	10×8	12×10
Focus	8in.	12in.	18in.	21in.	24in.
Price	**12/6**	**21/-**	**30/-**	**42/-**	**50/-**



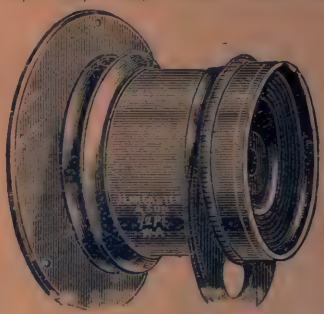
No. 375.

SUPERIOR LENSES.

IN RACKWORK MOUNTS.

Same Focus as No. 374.

¼	½	1	10×8	12×10	15×12
7/6	**15/-**	**22/6**	**30/-**	**37/6**	**45/-.**



WIDE ANGLE LENSES. No. 377.

These Lenses are very useful in confined situations and for copying full size in an ordinary Camera. The focus of each is given below.

Size	¼	½	1	10×8	12×10
Focus	4	6½	8½	10	12in.
Price	**10/6**	**15/-**	**21/-**	**25/-**	**30/-**

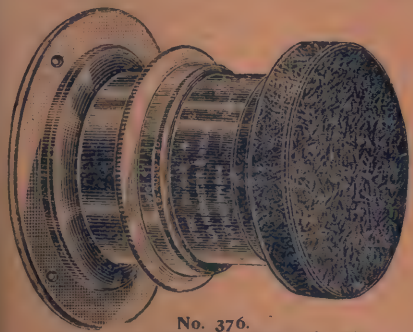
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

LANCASTER'S NEW LENSES.

THE RECTIGRAPH SERIES.

No. 376.



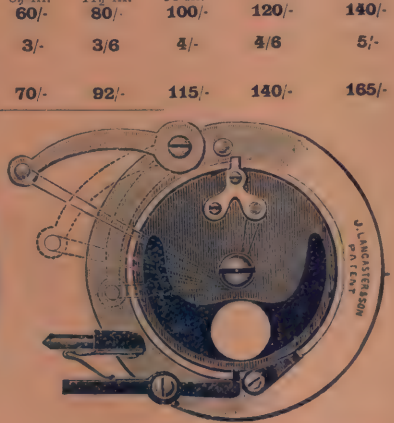
No. 376.
Silver Ring Rapid Rectigraph with Patent Adjustable Diaphragms.

THESE are a series of Lenses of the highest quality, and are the result of long and tedious experiments. With them can be obtained beautifully modelled portraits, excellent groups and landscapes, and for architectural work they cannot be excelled. The Lenses, being both perfectly symmetrical, will work full aperture for portraits and groups, and when stopped down a little will produce landscape and architectural photos that it would be impossible to surpass.

	¼	½	¼	10×8	12×10	15×12
Diam. of Lens	1⅛	1⅝	1⅞	2½	2¾	2⅝
Focus	5½-in.	8¼-in.	11½ in.	14-in.	18-in.	24-in.
Price	**40/-**	**60/-**	**80/-**	**100/-**	**120/-**	**140/-**
Leather cases, lined Silk, to carry Rectigraph ...	**2/6**	**3/-**	**3/6**	**4/-**	**4/6**	**5/-**
No. 376 A L—in Morocco Cases.— Mounted in Aluminium, Finest Quality	**50/-**	**70/-**	**92/-**	**115/-**	**140/-**	**165/-**



No. 378.



LANCASTER'S NEW INSTANTANEOUS LENS (PATENT

LANCASTER'S PATENT INSTANTANEOUS LENSES for Groups, Portraits, Landscapes, or Architectural Work, with our Patent Shutter, giving any length of exposure, and Patent Adjustable Diaphragm.

	¼	½	¼	10×8	12×10	15×12
Size ...	¼	½	1	14	17	21-in.
Focus ...	5½	8½	11			
PRICE ...	**21/-**	**30/-**	**42/-**	**52/6**	**63/-**	**84/-**

Rapid, Portable, Excellent Definition.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,



LANCASTER'S

RECTIGRAPH LENSES.

376 W.A.

RECTIGRAPH.

THESE Lenses are symmetrical, and when used either together as a Wide Angle Combination, or singly as a Narrow Angle Lens, the definition is perfect. The foci of Combination and Back Lens are both given below.

Mounted in Best Metal with Silver Ring.

	½	½	½	10×8	12×10	15×12	22×18
Focus of Wide Angle Rectigraph..	3½	5	6	8	10	13	17 in.
Focus of Back Lens...	7	10	12	18	22	27	35 in.
PRICE	30/-	42/-	50/-	63/-	70/-	80/-	120/-
Mounted in Aluminium	36/-	50/-	60/-	75/-	85/-	—	—

The graduations on Scale are for the Combination, and when using Back Lenses they must be doubled.



376 C.

Combination Rectigraph

(PATENT).

THESE Lenses are of the highest quality, great care being taken in their construction.

THE COMBINATION RECTIGRAPH can be used as a Wide, Ordinary, and Narrow Angle Lens, the different foci being given below.

Combination Rectigraph Lens.

	¼	½	½	10×8	12×10	15×12
Focus of Combination	3¼	4¾	6½	8	9	10 in.
,, Front Lens	5	8	10	12	14	16 in.
,, Back Lens	9	12	18	20	24	30 in.
PRICE	30/-	42/-	50/-	70/-	90/-	110/-
Mounted in Aluminium	36/-	50/-	60/-	80/-	105/-	—

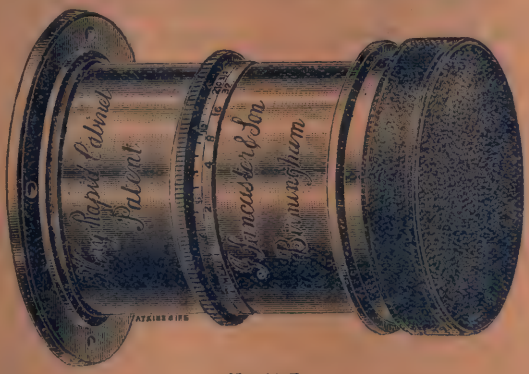
The Scale has three sets of Graduations :—First, for Combination ; Second, for Front Lens only ; Third, for Back Lens only.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

PORTRAIT LENSES.

Messrs. J. LANCASTER & SON have succeeded in producing Portrait Lenses of the highest quality at most reasonable prices.



No. 381B.

Series A.—Giving excellent Definition.

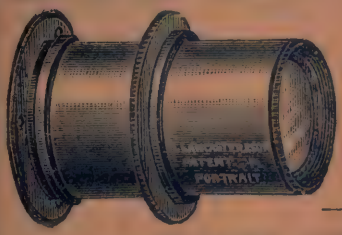
379a	CARTE LENS, with Iris Diaphragms, Excellent Working Lens			£1	10 0
380a	CABINET LENS,	ditto	ditto	3	3 0
	FULL PLATE PORTRAIT LENS,	ditto	ditto	5	5 0
	12×10	ditto	ditto	12	12 0

These Lenses have given great satisfaction.

Series B.—Giving Superb Definition, with great Rapidity of Action.

FIRST QUALITY RAPID PORTRAIT LENSES.

381b	VERY RAPID CARTE LENS, with Iris Diaphragms										£3	15	0
382b	VERY RAPID CABINET LENS, with Iris Diaphragms										5	10	0
383b	Ditto	ditto	ditto	Full Plate							10	0	0
384b	Ditto	ditto	ditto	12×10							18	18	0



Portrait Lens,

WITH PATENT DIAPHRAGMS.

No. 376P.

¼, 21/- ½, 42/- 1, 63/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

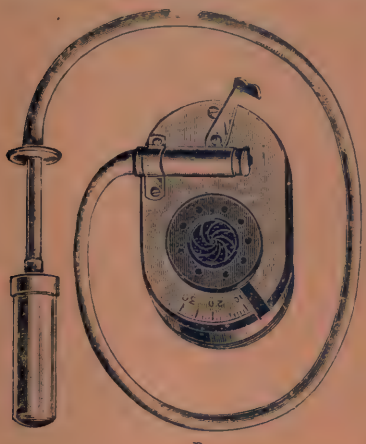
LANCASTER'S NEW SHUTTER.

...THE...

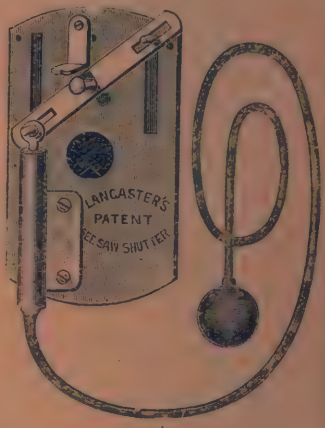
"See-Saw" Shutter

... The SIMPLEST, SAFEST, and MOST COMPLETE SHUTTER EVER MADE...

Over 20,000 have been already sold, and the demand is increasing enormously.



B



A

THE "SEE-SAW" PATENT.

The Shutter opens and closes in the centre, and consists of two plates moving across each other perfectly smooth and without any vibration. They are moved by means of a cylinder and piston connected with a beam or "see-saw" arrangement, which moves both together. There is a small lever at the top of shutter, which, when pulled down, allows shutter to open only, and on release of pressure on pump, to close; by turning lever upwards, the shutters shoot across at a high speed, regulated by pressure on pump.

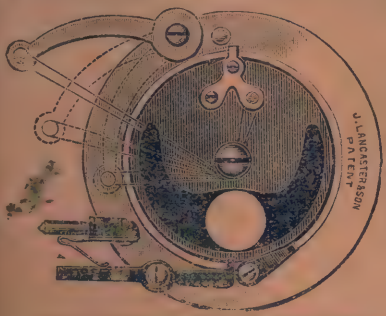
PRICES COMPLETE.

No.	1—½-Pl.	2—½-Pl.	3—½-Pl. c. ¼ Pl. Rect.	4—10×8 or ½-Pl. Rect.	5—12×10 or½-Pl. Rect.	6—20×18 or up to 15×12Rec.
Dia. of Aperture	½-in.	¾ in.	1-in.	1½-in.	1¾-in.	2½-in.
Form A	6/6	8/6	10/6	12/6	15/-	21/-
„ B—Ever set "See-Saw" Shutter with Iris Diaphragm	7/6	10/3	12/6	—	—	—
Aluminium "See-Saw" Shutters	10/-	12/6	15/-	17/6	21/-	—

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

INSTANTANEOUS SHUTTERS.



LANCASTER'S PATENT

Instantograph Shutter.

WITH this patent Shutter almost any exposure may be given, as bands of all strengths may be used, and two or three may be used at the same time; an exposure of 100th of a second can be obtained with it, down to almost anything.

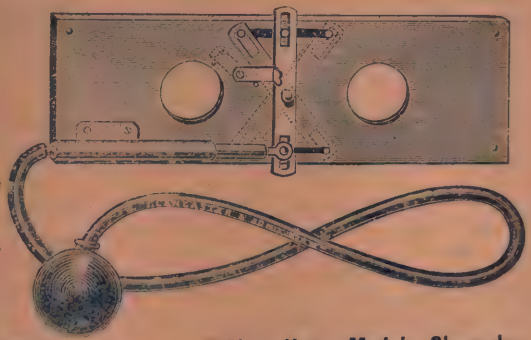
¼	½	¼	10×8	12×10
5/-	7/6	10/-	12/6	15/-

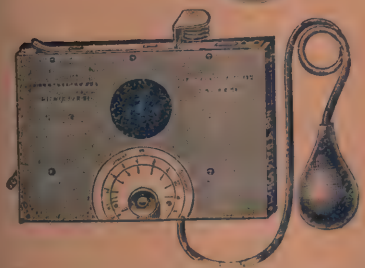
Of this Shutter over 60,000 have been sold.

Lancaster's Stereoscopic See-Saw Shutter,

With Pneumatic Arrangement,

17/6





The New Model Chronolux opens and closes at the centre and moves without the slightest vibration; it works from $\frac{1}{64}$th of a second to 3 seconds, and by moving the Lever on the left-hand side any length of exposure may be obtained. The Shutters are beautifully finished, gilt, and oxidised.

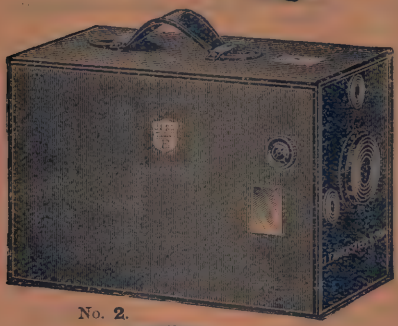
¼	½	¼	10×8	12×10
25/-	30/-	35/-	42/-	50/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,



No. 1.



No. 2.



No. 387

LANCASTER'S

New Hand Camera

THE 1898 "STOPIT"

(PATENT).

This is the smallest, most compact, and handiest Camera in the market; it has an excellent Lens, with Iris Shutter (time or instantaneous), and Featherweight Double Metal Slide.

No. **1** "**Stopit,**" for ¼ plates, with one Finder and Lens of fixed focus **10/6**

No. **2** "**Stopit,**" ditto, ditto, with best Lens, having Rackwork Adjustment, Horizontal and Vertical Finders, etc., **15/-**

No. **3** "**Stopit,**" Superior Apparatus, with three Double Slides, carrying six ¼ plates, **21/-**

No. **4** "**Stopit,**" same as No. **1,** but for Cabinet or ½ plate, **21/-**

No. **5** "**Stopit,**" ditto as No. **2,** for ½ plate, **30/-**

No. **6** "**Stopit,**" for ½ plate as No. **3, 42/-**

387 Set of 3 Featherweight Metal Double Slides, in Leather Case, with Shoulder Straps to fit above Cameras, **9/6**

Extra Metal Slides, 2/6 each.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

..LANCASTER'S..

1898 "Omnigraph"

(PATENT).

EVERYBODY'S HAND CAMERA.

Weight, 1½ lbs.



SIMPLE, COMPACT, PORTABLE.

The Omnigraph is an excellent Hand Camera, with Meniscus Achromatic Lens and See-Saw Shutter. The Plates are carried in Metal Slides, or in Carriers in a Changing Box, and are supplied in either form at the same price.

388MS	Omnigraph, with three Lancaster's Patent Metal Slides, carrying six ¼ plates or films	£1 1 0
	Omnigraph, ditto, ditto, with three Metal Slides, carrying three ¼ plates or films	2 2 0

Omnigraph with Changing Box.

This form of Omnigraph has a similar Lens and Shutter, but the Plates are carried in Lancaster's Patent Carriers in a Changing Box, which carries six plates or films. These are fed into the Camera by putting Changing Box into Camera and drawing out Slide, then are returned by putting Changing Box in reverse way, when plate goes on opposite side of box after exposure.

388CB	Omnigraph, with Lens, Shutter, etc., as above, but with Changing Box, carrying six ¼ plates or films	£1 1 0
388CB	Omnigraphs for six 5×4 plates or films	1 10 0
388CB	Omnigraph for six ½ plates or films	2 5 0

EXTRA CHANGING BOXES, WITH PATENT METAL CARRIERS.

¼	5×4	½
7/6	10/6	15/-

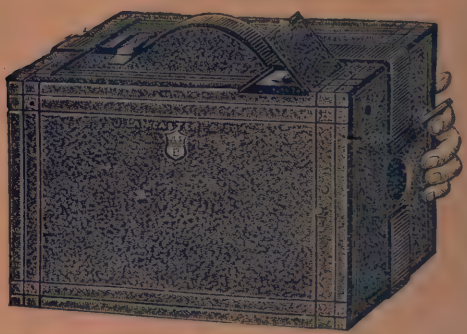
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

Lancaster's Superior "OMNIGRAPH"

(PATENT).

EVERYBODY'S DETECTIVE.



SIMPLE, EFFICIENT.

388 S0 is a **Superior Omnigraph,** covered in best leather. It has better quality Lens, with Iris Diaphragm, See-Saw Shutter, Changing Box carrying six plates or films.

¼ pl., **31/6** 5×4 pl., **42/-** ½ pl., **63/-**

EXTRA CHANGING BOXES, CARRYING SIX PLATES,

¼ pl., **7/6** 5×4 pl., **10/6** ½ pl., **15/-**

BEST LENS, IRIS DIAPHRAGM, SEE-SAW SHUTTER.



BEST FINISH, DOUBLE FINDER, PNEUMATIC RELEASE.

388 P0 is a **Perfect Omnigraph**, and has Horizontal and Vertical Finders, Best Lens and Shutter, Rack Adjustment, Divided Scale of Distances, Pneumatic Release, &c., &c.

¼ pl., **£2 2 0** 5×4 pl., **£3 3 0** ½ pl., **£4 4 0**

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

LANCASTER'S

"Perfect Omnigraph"

(PATENT).



389

389 Perfect Omnigraph, covered n best Leather, Instantaneous Lens, with Iris D phragm and See-Saw Shutte Double Finder, Rack Adjus ment, Divided Scale, etc., etc., with three Patent Metal Slid carrying six Plates or Films.

¼ size, **£2 2 0**
½ plate, **£4 4 0**

EXTRA METAL SLIDES, CARRYING TWO PLATES.
¼ plate, **2/6** each; ½ plate, **4/6** each.

Lancaster's Stereo Omnigraph

is an excellent Hand Camera for Stereoscopic work. I has Changing Box and Metal Carriers carrying six Plates and is made in three qualities.



Cloth-covered Stereo Omnigraph	**£2 2 0**
Superior Covered Leather Omnigraph	**3 3 0**
Perfect Omnigraph	**4 4 0**

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

LANCASTER'S PERFECT

HAND, MAGAZINE, OR DETECTIVE CAMERA.

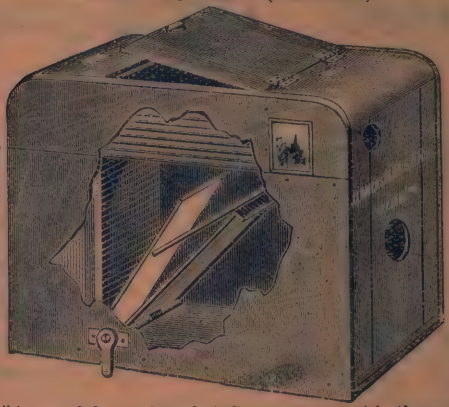
"THE ROVER" (PATENT).

No. 386.

COMPLETE.

No. 1.
$3\frac{1}{4} \times 3\frac{1}{4}$
£2 12 6

No. 2.
$4\frac{1}{4} \times 3\frac{1}{4}$
£3 3 0



No. 3.
5×4
£4 0 0

No. 4.
$6\frac{1}{2} \times 4\frac{1}{2}$
£5 5 0

THE "ROVER" is one of the most perfect Cameras ever put in the market; it consists of practically three chambers, (A) a space on top holding twelve Plates or Films in our new patent Sheaths or Carriers, (B) the Camera proper, and (C) a space at back to hold twelve plates after exposure. Each chamber is light-proof.

The method of exposure is as follows:—Press Lever at bottom of Camera slightly forward, this allows one Plate to fall, then move Lever backward and Plate falls into position.

The plate, after exposure, goes into back chamber, a Venetian shutter being opened and closed.



The Lens is a specially made one, very rapid, with See-saw Shutter, Patent Adjustable Diaphragms, and each Camera has a Finder. The whole is enclosed in a best Leather Case, of most convenient and handy size.

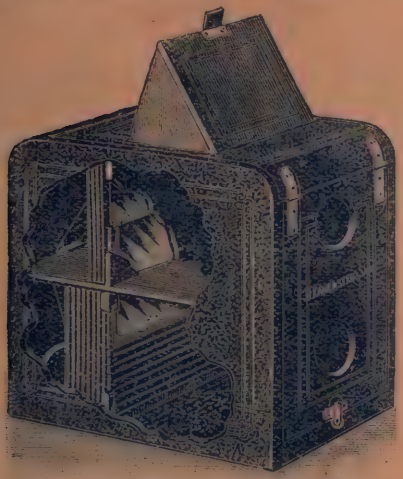
Only one Plate is in Camera at time of exposure, all others are in light-proof chambers.

The Camera is exceedingly simple in use.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

LANCASTER'S LATEST HAND CAMERA.



THE "ZOEGRAPH" (Patent).

THIS is a New Hand Camera, carrying twelve Plates or Films in special Metal Carriers, which are carried in the lower half of Camera, and after exposure, by a simple movement of Venetian Shutter, are carried into upper half. The Lens is a very rapid one, of latest construction, with best Shutter, etc. The Finder is full size of Plate, and has a Cover which only allows a small aperture for viewing image through, thus giving a bright, full sized image of object the moment of exposure.

"Zoegraph," complete, ¼ plate	£3 3 0
,, ½ ,, ...	5 5 0

"POCKET ZOEGRAPH."

POCKET ZOEGRAPH, carrying twelve Films, 2⅛-in. × 1⅝-in., made to carry in the pocket. A complete instrument, with special Lens and Ever-set Shutter and Daylight Finder.

To carry twelve Films, 3¼×2¼-in. **£1 11 6**

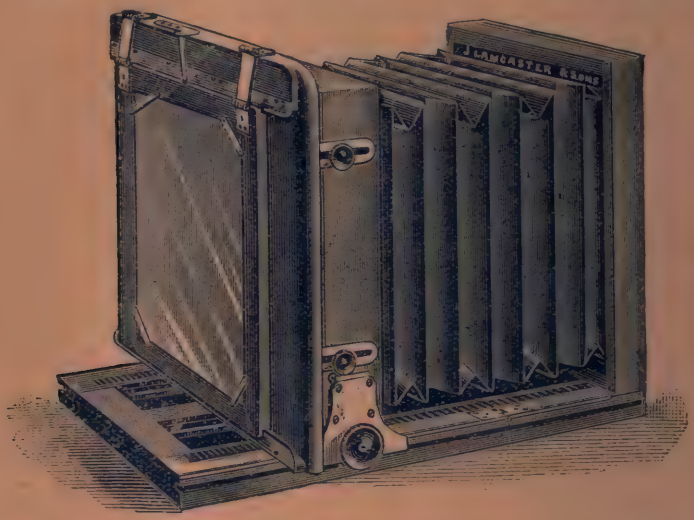
RAPID FILMS.

3¼-in.×2¼-in. ... ... **1/6** per dozen.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

New Studio Camera.



398 UNIVERSAL CAMERA, ½-plate, with Repeating Back, Rack Adjustment Double Swing, Bellows Body, taking Cabinet, Portrait or Group, and one or two Cartes on a plate **£2 5 0**

Extra Slides, 12/6 each.

398b BRASS BOUND STUDIO CAMERA of best quality and finish, Leather Bellows **3 5 0**

Extra Slides, 17/6 each.

399 UNIVERSAL CAMERA, ½ plate, ditto, ditto, taking two Cabinets on one plate, two Cartes on one plate, or one Cabinet or one Carte **3 10 0**

Extra Slides, 18/- each.

399b BRASS BOUND ditto, ditto... ... ... **4 12 6**

Extra Slides, 24/- each.

400 UNIVERSAL CAMERA, 10×8, ditto, ditto, to take Promenade, Malvern, Cabinet, and Carte size **6 5 0**

Extra Slides, 24/- each.

400b BRASS BOUND ditto, ditto... ... ... **7 10 0**

Extra Slides, 35/- each.

401 UNIVERSAL CAMERA, 12×10, with Carriers for all sizes down to ½, and every convenience for large studio work **9 9 0**

401b BRASS BOUND, ditto, ditto **11 0 0**

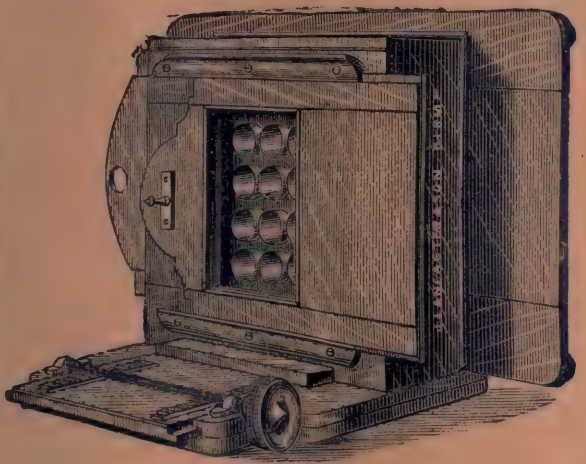
Extra Fronts, **398**, 2/6 **399**, 3/- **400**, 3/6 **401**, 4/-
Double Dry Slides, **398**, 15/- **399**, 21/- **400** 30/- **401**, 42/- each.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

GEM APPARATUS.

Will take 36 Gems on 7×5 plate.



Will take 13 Gems on ¼ plate.

No. 406 APPARATUS.

OUR Apparatus has now been in the Market for years, and has received the highest approbation. We guarantee every Lens of the best quality

403	Polished Mahogany Camera, with 4 superior double combination Achromatic Lenses, Repeating Back, taking 12 superior gems on a ¼-plate Ferrotype	£2	10	0
404	Ditto ditto with 6 Lenses to take 12 on ¼-plate in two positions, with Rackwork Adjustment	3	0	0
405	Superior ditto, with 9 Lenses, to take 9 on ¼-plate or 18 on 5×3½-plate, with Rackwork Adjustment	4	0	0
406	Superior Mahogany Camera, with 12 selected Lenses, Rackwork Adjustment, Instantaneous Shutter, will take 9 gems on ¼-plate, 12 on ¼-plate, 24 on 5×4, and 36 on 7×5 plate, etc.	6	6	0

GEM LENSES.

FINEST QUALITY, **6**/- per Lens, in sets of 4, 6, 9 and 12 on plate.
SECOND QUALITY, **5**/- per Lens, in sets of any number.

VICTORIA LENSES.

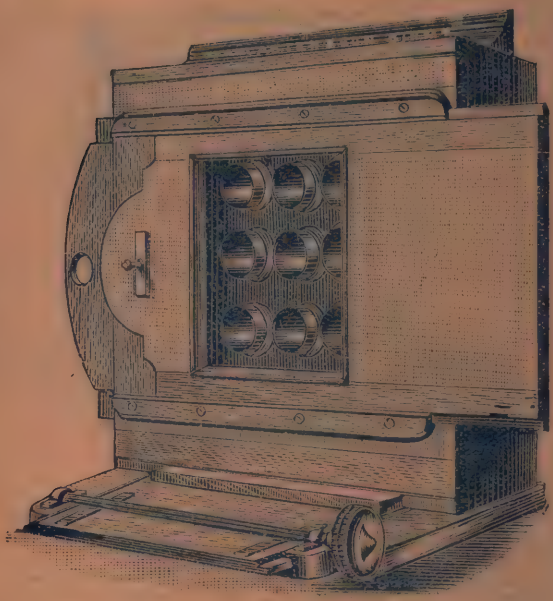
FINEST QUALITY, **9**/- per Lens, in sets of 2, 4, 6 or 9 on plate.
SECOND QUALITY, **7**/- per Lens, in sets of any number.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

Gem and Victoria Apparatus.

Will take 36 Gems on 7×5 plate.
" 9 Victorias " "



Will take 12 Gems on ¼-plate.
" 4 Victorias "

No. 410

407	Polished Mahogany Camera, with 2 large Achromatic Double Combination Lenses, to take 4 Victorias in two positions, on ½-plate	£2 10 0
408	Superior Camera, with Rackwork Adjustment, Instantaneous Shutter, 4 best Lenses, to take 4 Victorias on ½-plate	3 10 0
409	Excellent Camera, with Rackwork Adjustment, Repeating Back, and Set of Victoria Lenses, to take either 4 Victorias at once on ½-plate, or 8 on 7×5 plate in two positions	5 5 0
410	Combined Gem and Victoria Camera, best quality, with 9 selected Victoria Lenses, extra Dark Slide, Rackwork Adjustment, and all latest improvements, taking 4 Victorias on ½-plate, 9 Victorias on 7×5, or 36 Gems on 7×5 in four positions	8 8 0

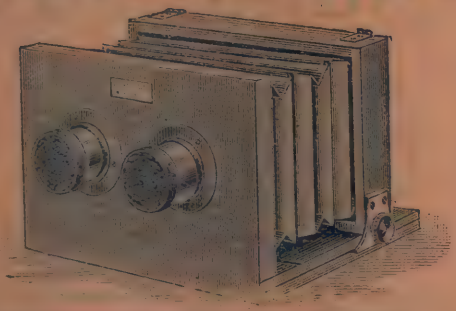
Apparatus for Carte Midgets, &c. Other Sizes and Combinations to order.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

STEREOSCOPIC CAMERAS.

— BEST LENSES. — RAPID OR SLOW AT WILL.

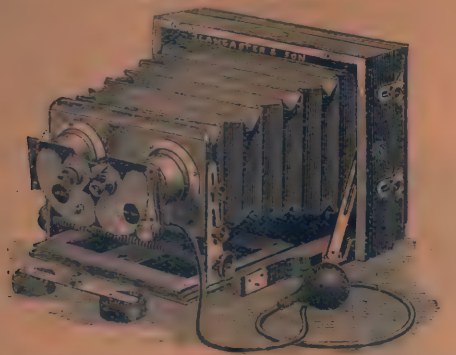


CAMERAS BEST MAKE. — PORTABLE. —

STEREO MERVEILLEUX.

419 The Stereo Merveilleux consists of a well-made mahogany Camera, with one Double Slide, pair of good Lenses, and Camera Stand ... **£2 2 0**

420 The Stereo Meritoire, much superior **3 3 0**



STEREO INSTANTOGRAPH.

421 The Stereo Instantograph is a most excellent apparatus with Instantaneous Shutter, best Lenses and Stand; the Slide measures 6¾×3¼ **£1 4 0**

422 The Stereo Instantograph, with an arrangement for taking plates 7¼×4¼ and smaller plates, and extra bellows for Stereo work; a splendid Camera for general work **5 5 0**

Rectigraph Lenses, fitted to **421** and **422, £2 2 0** extra.

Double Dry Slides, **419** and **420, 10/6; 421, 12/6; 422, 15/-** each.

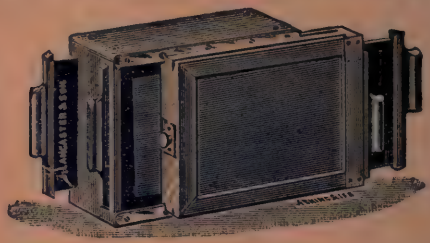
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

— IMPROVED —

CHANGING BOXES.

New Form.



Much Improved.

THE NEW CHANGING BOX, containing Patent Metal Carriers, carrying 12 Dry Plates, which can be transferred in a few seconds to or from the Dark Slide, with the greatest ease, and in the brightest sunshine, without fear of fogging the plate. It is much superior to the old form of Changing Box.

391	Changing Box and Slide, carrying 12 ¼ plates to fit Instantograph or International		**£0 18 6**
392	,, ,, ,,	Brass Bound	**1 0 0**
393	,, ,, ,,	12 ¼ plates	**1 10 0**
394	,, ,, ,,	Brass Bound	**1 16 0**
395	,, ,, ,,	12 ¼ plates	**2 0 0**
396	,, ,, ,,	Brass Bound	**2 8 0**



Lancaster's Patent

METAL SLIDES.

A PERFECT METAL SLIDE, carrying two plates, and weighing half as much as a mahogany slide same size; charged and emptied in a moment.

½ plate	**2/6**	each.
¼ ,, ...	**4/6**	,,

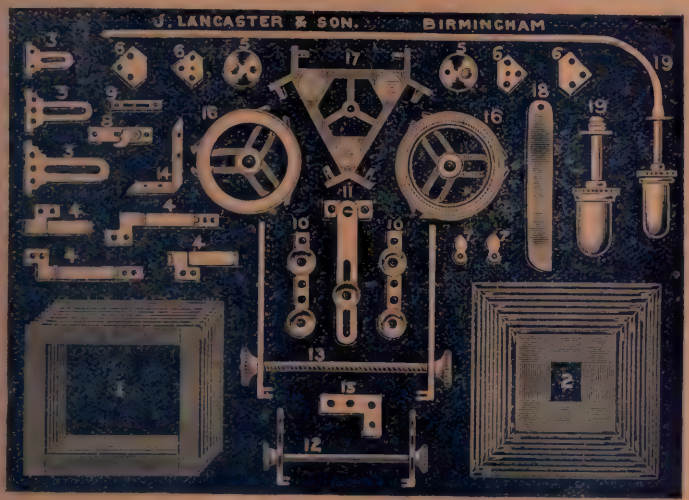
ADAPTERS to MERVEILLEUX, MERITOIRE or INSTANTOGRAPH for Metal Slides—

½ plate	**2/-**	each.
¼ ,, ...	**3/-**	,,

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

SUNDRIES.

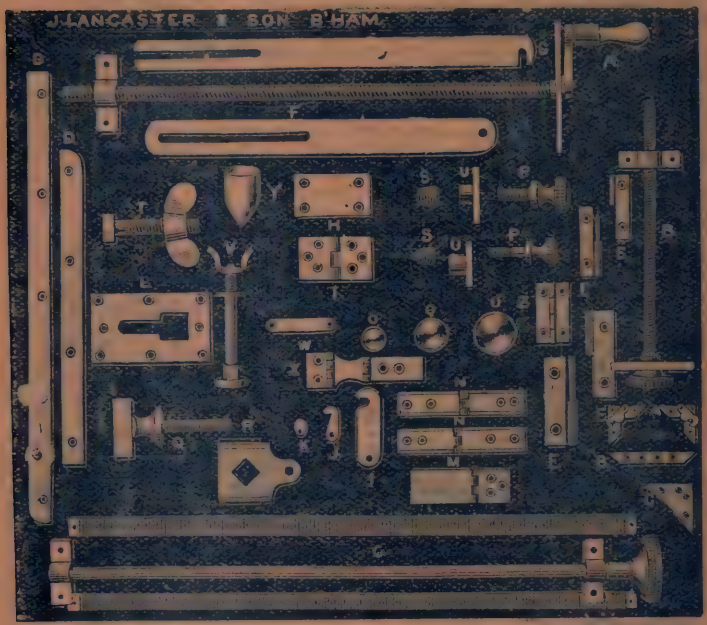


	¼	½	1	10×8	12×10	15×12
1—Cloth Bellows, ordinary length	1 6	3/-	4 6	6/-	9/-	12/-
,, ,, ,, square	2/-	3 9	5 6	7 6	10/-	12/-
,, ,, ,, Kinnear ...	2 6	5/-	7 6	10/-	15/-	18 6
2—Leather Bellows, ,, oblong	2 3	4 6	6 3	8 6	12 6	15/-
,, ,, ,, square	3/-	6/-	8 6	10 6	15/-	20/-
,, ,, ,, Kinnear ...	4/-	8/-	12 6	15/-	21/-	30/-
3—Swing-back Plates ... ... each	/2	/2	/3	/3	/4	/4
4—Patent Focussing Hinges ... set of 4	1/-	1/-	1/-	1/-	1/-	1/-
5—Circular Catches for Reversing Backs, pair	/6	/6	/6	—	—	—
6—Circular Catch Angle Plates per pair	/2	/2	/2	—	—	—
7—Focussing Screen Bent Catches ... each	/2	/2	/2	/2	/2	/2
8—Cheese Cutters ... ... ,,	/6	/6	/6	/6	/6	/6
9—Slotted Plates for ditto ... ... ,,	/1	/1	/1	/1	/1	/1
10—Plates and Screws for Sides of Camera Fronts ... ... each	/9	1/-	1 3	1 6	1 9	2/-
11—Side Stays and Fittings for "Instantograph" ... ... each	1 3	1 6	2/-	2 6	3/-	3/-
12—"Merveilleux" Front Stages ... ,,	1 6	2/-	2 6	3/-	3 6	4 6
13—"Instantograph" ditto ... ... ,,	2 3	3/-	4/-	4 6	5/-	5 4
14—Brass Corners ... ... ,,	/2	/2	/3	/3	/4	/4
15—Brass Plates for Slides ... ... ,,	/2	/2	/3	/3	/4	/6
16—Brass Circular Tops for Stands	1 6	2/-	2 6	3/-	3 6	4/-
17—Triangle ditto	2 6	3/-	4/-	5/-	6/-	7/-
18—Springs for Printing Frames, per pair ...	/3	/4	/6	/8	/10	1/-
19—Patent Pumps for Shutters	1 3	1 6	1 6	1/6	2/-	2/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

SUNDRIES



			¼	½	¾	10×8	12×10	15×12
A.	Strong Screw for Cameras,	each	2/6	4/-	6/6	8/6	10/6	12/6
B.	Lighter ,, ,,	,,	2/-	3/6	5/6	7/6	8/6	10/6
C.	Racks and Pinion	,,	3/-	5/-	7/6	10/6	12/6	15/-
D.	Brass Strips for Camera Backs,	pair	-/6	-/9	1/-	1/3	1/6	2/-
E.	Pull-off Hinges...	,,	-/2	-/2	-/3	-/3	-/3	-/3
F.	Side Stays with Screws ...	each	1/3	1/6	2/-	2/6	3/-	3/6
G.	,, for Instantograph	,,	1/-	1/6	2/-	2/6	3/-	3/6
H.	Plates for Stands	,,	-/1	-/1	-/2	-/2	-/2	-/2
I.	Hinges for Tail Board	per pair	-/2	-/3	-/4	-/4	-/6	-/6
J.	Hooks for Slides	,,	-/1	-/1	-/1	-/1	-/1	-/1
J.	,, Stands	,,	-/2	-/2	-/3	-/3	-/4	-/4

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

SUNDRIES—*Continued.*

		¼	½	¾	10×8	12×10	15×12
K.	Turn Buttons for Slides per pair	-/1	-/1	-/1	-/1	-/1	-/1
L.	Plates for bottom of Cameras ,,	-/6	-/9	1/-	1/-	1/6	1/6
M.	Clip Hinges for Dark Slides ,,	-/2	-/2	-/3	-/3	-/4	-/4
N.	Hinges for Focussing Glass ,,	-/2	-/2	-/3	-/3	-/4	-/4
O.	Rising Front Screws ... each	-/4	-/5	-/6	-/8	-/8	-/8
P.	Screws for bottom of Camera ,,	-/4	-/6	-/6	-/6	-/9	-/9
Q.	T Screws for Stands ... ,,	-/6	-/8	-/8	1/-	1/-	1/-
R.	Ears for Stands ... per set of six	-/4½	-/6	-/9	1/-	1/-	1/4
S.	Bushes for Screws ... per pair	-/1	-/1	-/1	-/2	-/2	-/2
T.	Screw and Butterfly for Stands ...	-/6	-/9	1/-	1/3	1/6	1/6
U.	T Bushes for Cameras ... each	-/1	-/2	-/2	-/3	-/3	-/3
V.	Screws for Stands, set of 3	1/-	1/3	1/6	1/6	1/9	2/-
W.	Straps for Focussing Frame, per set of 4	-/2	-/3	-/4	-/4	-/4	-/4
X.	Double Hinges for Focussing Frame	-/3	-/3	-/4	-/4	-/6	-/6
Y.	Toe Caps, all in one piece (3) ...	-/3	-/4	-/4	-/6	-/6	-/9
Z.	Hinges for Dark Slides, etc., per pr.	-/2	-/3	-/4	-/4	-/6	-/6
A′	Corner Plates for Reversing Back, etc., per pair	-/3	-/4	-/4	-/6	-/6	-/6
B′	Corner Plates for Slides, etc , ,,	-/2	-/2	-/3	-/3	-/4	-/4
C′	Angle Plates for Reversing Back, etc., per pair	-/2	-/2	-/3	-/3	-/4	-/4

Complete set of Brass Work for 1898 Le Merveilleux	5/6	7/6	10/6	12/6	15/-	
Ditto for 1898 Meritoire	7/6	10/6	12/6	15/-	18/-	
Ditto for 1898 Instantograph ...	10/6	15/-	21/-	25/-	30/-	
Fine Ground Focussing Glass	-/6	1/-	1/6	2/-	2/6	3/-
Merveilleux Lens, unmounted	3/-	6/-	10/-	15/-	20/-	30/-
Instantograph ,, ...	12/6	21/-	30/-	40/-	50/-	60/-
Leather Caps for Lenses	-/6	-/6	-/8	-/8	1/-	1/-
Black Cardboard for Slides per doz.	-/6	-/9	1/-	1/6	2/-	2/6
Flanges for Lenses...	1/-	1/6	2/-	2/6	3/-	3/6
Extra Fronts	1/-	2/-	2/6	3/-	3/6	4/-

BELLOWS OF ANY SIZE MADE TO ORDER.

DARK SLIDES MADE TO ORDER.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

CASES FOR CAMERAS.





The Leather-Bound Case.

A WELL-MADE CASE, CARRY CAMERA, LENS AND THREE SLIDES.

¼, **7/6**; ½, **10/6**; 1, **15/-**; 10×8, **21/-**; 12×10, **25/-**; 15×12, **30/-**

These Cases are strong, and are lined with Green Baize.

Waterproof Cases.

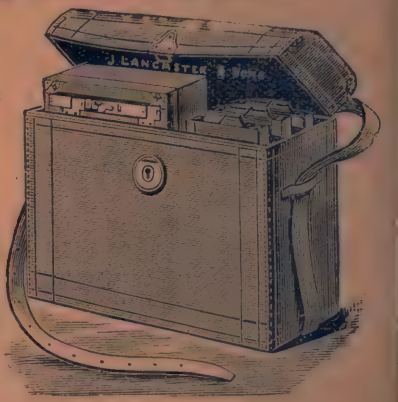
WITH SHOULDER STRAPS.

¼, **5/-**; ½, **7/6**; 10×8, **10/-**; 10×8, **12/6**; 12×10, **15/-**; 15×12, **17/6**.

Best Leather Cases.

¼, **17/6**; ½, **25/-**; 1, **35/-**; 10×8, **42/-**; 12×10, **45/-**; 15×12, **50/-**.

These are made out of the best hide, lined with velvet, with partitions to carry Camera, Lens, three Slides, Tailboard, etc. Nickel-plated Lock and Key, Hand and Shoulder Straps.



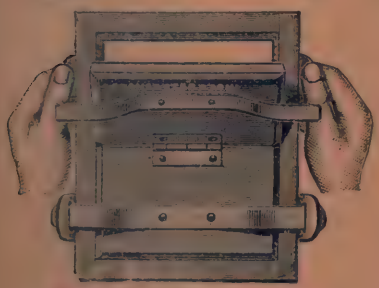
OTHER SIZES MADE TO ORDER.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

PRINTING FRAMES.

	¼	½	¼	10×8	12×10	15×12
Cheap Printing Frames ...	6d.	1/-	1/6	2/-	3/-	4/-
Best Quality	9d.	1/6	2/3	3/-	4/3	5/3



New Printing Frame.

WITH SIDE CLIP ARRANGEMENT.

¼ plate ... 9d. ½ plate ... 1/6
¼ „ ... 2/3 10×8 „ ... 3/-



. . . LANCASTER'S . . .

New Mahogany Triple Pressure Printing Frame

enabling both ends of Print to be examined at same time without the least fear of moving Print.

½, 1/6; ¼, 2/3; Stereo. 2/3; ¼, 3/6; 10×8, 4/9; 12×10, 6/-; 15×12, 7/6 each. This is a perfect Printing Frame; no unequal pressure and no breaking of negatives. The Frames are well made and durable.

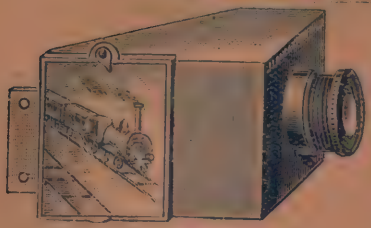
PLATE BOXES, &c.

	¼	½	¼	10×8	12×10	15×12
White Wood Plate Boxes to hold 12 ...	1/-	1/9	2/6	4/-	5/-	7/-
Ditto ditto ditto 25 ..	1/6	2/3	3/6	5/6	7/-	9/6
Ditto ditto ditto 50 ...	2/-	3/-	4/-	6/6	8/-	10/6
Draining Racks, 12	1/3	1/6	2/-			
Ditto ditto 24	1/6	2/-	2/6			
Mahogany Plate Boxes, with Lock and key, to hold 12 Plates	3/-	4/-	6/-	8/6	10/6	12/6
Vignette Glasses	9d.	1/6	2/3	3/-	4/6	

CARDS.—Carte Size, 1/-, 1/3, 1/6, 1/8, 2/-, 3/-, and 4/- per 100.
Ditto Cabinet Size, 6d., 8d., 1/-, and 1/6 per dozen.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,



— LANCASTER'S —

New Finder.

THIS is an excellent Finder, which can be attached in a second to the side or top of Camera, giving an exact image, covering same field as Lens in Camera.

Price 5s. Beautifully Finished.

With two Brackets, one to screw on to side and the other on top of Camera.

LANCASTER'S AMATEURS'

RETOUCHING DESK

Folding into small compass, fitted with two Retouching Pencils, with side wings.

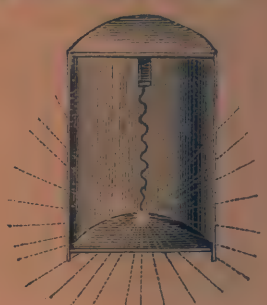
¼-plate, **5/-**; ¼-plate, **7/6**; ½ plate, **10/6**; 10×8, **15/-** 12×10, **21/-**

RETOUCHING DESKS

IN POLISHED MAHOGANY OF HIGHEST FINISH.

¼, **12/6**; ½, **15/-**; ½, **18/-**; 10×8, **22/6**; 12×10, **30/-**

MAGNESIUM LAMPS



For taking Portraits at night ... **3/6**
Magnesium Ribbon, per yard ... **-/2**
Ditto, per ounce **3/-**
Ditto, Torches, each ...**3/6** and **6/6**

Retouching Desk.



Rubber Squeegees **-/9**, **1/-**, and **1/6**.
Print Trimmers, **1/-** and **2/6**.

COLMORE ROW, BIRMINGHAM.



J. LANCASTER & SON, Opticians,

Compound Focusser.

To be used without a Cloth, 2/6.

A most useful Accessory.

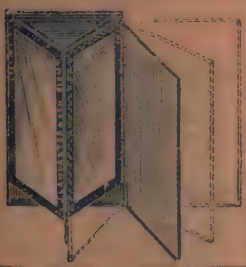




Ruby Lamps.

RUBY LAMP with self-feeding arrangement for Candle 3/-

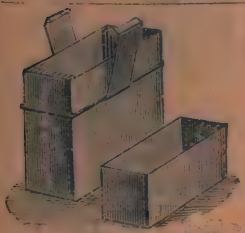
Ditto, ditto, with Oil Burner ... 2/-



LANCASTER'S PATENT FOLDING LAMP.



This Lamp folds into ¾in., and is opened or closed in less than one second. It has a self-feeding Candle Chamber and when opened, as in woodcut, may have the door closed on one half, giving only darkest Ruby light, and may, as developing proceeds, be gradually opened, thus regulating amount of light to the greatest possible nicety. 5/-



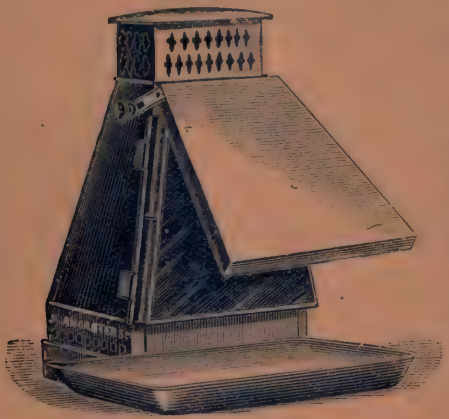
LIGHT-TIGHT PLATE BOXES.

Made of Metal, blackened, to hold 1 dozen ¼-plates	1/3
Ditto, 1 dozen ½-plates	3/-
„ 1 „ ¼ „	4/3
„ 1 „ 10×8	6/-
„ 1 „ 12×10	7/3

EBONITE TWEEZERS, **3d.** per pair.
GLASS MEASURES, common, **4d.** and **6d.** each.
GLASS MEASURES, best, 1 oz., **9d.**; 2oz., **1/-**; 4oz., **1/3**; 6oz., **1/6**; 8oz., **1/9**; 20oz., **2/6**.
BOXES OF SCALES AND WEIGHTS, with Brass Pans, **3/-** Ditto, with Glass Pans, **4/-**
GLASS FUNNELS, **4d.**, **6d.**, **9d.** and **1/-**
CUTTING SHAPES, Carte, **6d.**; Cabinet, **1/-**; Full Plate, **2/-**; 10×8, **3/-**
OVAL „ „ „ **9d.** „ **1/6** „ **2/6** „ **3/6**
FOCUSSING CLOTH, **1/6** VELVET ditto, **3/-** and **4/-**

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,



RUBRALUX CLOSED FOR USE.

Lancaster's New "Rubralux" Lamp.



RUBRALUX OPEN.

.. LANCASTER'S ..
NEW DARK-ROOM LAMP.

THE "RUBRALUX" PATENT.

THIS Lamp is said to be the best ever invented for the Dark Room. The Rubralux consists of a paraffin lamp giving a large amount of light, with a parabolic reflector reflecting the light forwards and downwards.

There are two folding glazed doors, one Ruby and the other Canary Yellow. Each can be used separately or both together. The front is hinged and lined with silvered reflector; which floods the plate with ruby light, and prevents any light reaching the eye of operator excepting that reflected from plate.

Price **7/6**

Larger Lamp, **10/6**; Ditto for Gas, **12/6**



LARGE PARABOLOID LAMP.

THIS is an excellent Lamp for a large room; it gives a large amount of light, and has sliding frames containing coloured screens. It is made with Oil Burner, and also with Solar Gas Burner.

Oil Paraboloid Lamp, complete, **10/6**; Gas Paraboloid Lamp, complete, **17/6**.

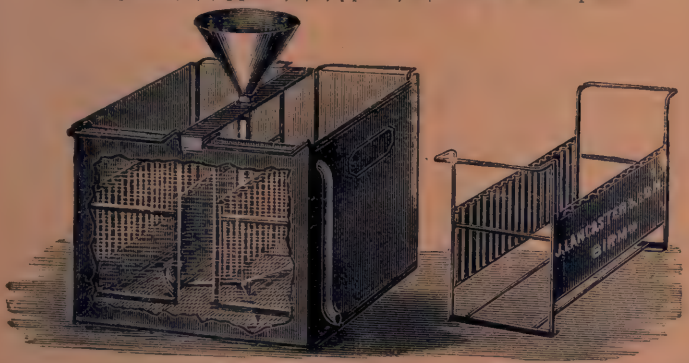
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

LANCASTER'S "HIERO" WASHER

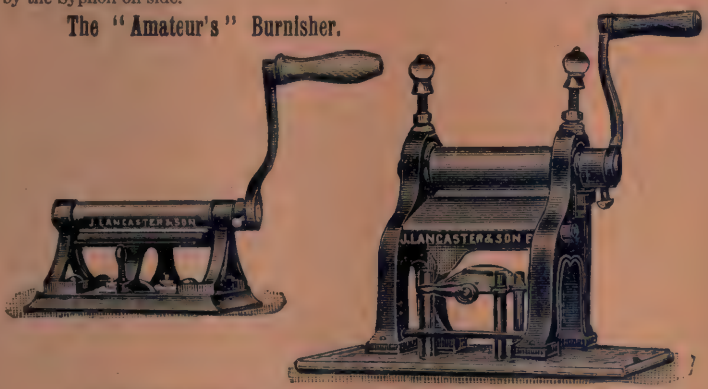
FOR NEGATIVES AND PRINTS.

For 26 ½-plates, **5/-**; ¼-plates, **7/6**; ⅛-plates, **10/6**. Each holds 26 plates.



THE "HIERO" WASHER consists of a square metal vessel, japanned outside, and enamelled inside. It has two racks to hold the plates, which may be used as dryers. The water enters through funnel and passes down centre tube and out of the bent ends thus causing the funnel and tubes to rotate; this gives a supply of water under the whole of the plates, and keeps up a continuous circulation, the waste being emptied periodically by the Syphon on side.

The "Amateur's" Burnisher.



LANCASTER'S AMATEURS' BURNISHERS.

WELL-MADE AND EXCELLENT IN ACTION.

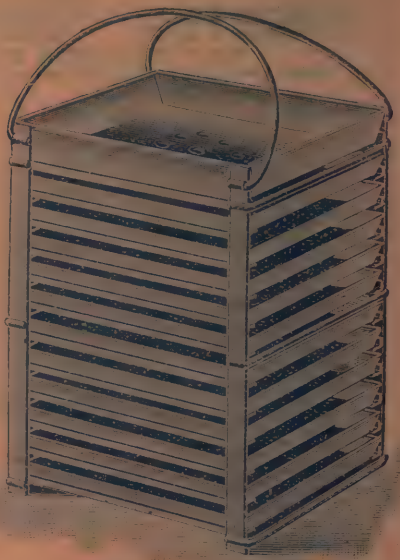
Carte, **10/6**; Cabinet, **15/-**; ¼, **21/-**; 10×8, **24/-**; 12×10, **27/6**; 15×12, **31/6**.

Superior Quality, ½, **15/-**; ½, **21/-**; ¼, **30/-**; 10×8, **35/-**; 12×10, **40/-**.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

LANCASTER'S 'PERFECTION' WASHER.



LANCASTER'S New Washer meets a long-felt demand for a simple, efficient and perfect Washer. The plates are laid face upwards in separate dishes with concave bottoms. The water falling from a tap on to first plate, flows over it and underneath, through a series of holes on to second plate, and so on to last plate. A small flow speedily removes every trace of hypo.

Prices for 12 Plates.

¼-plate, 6/6 ½-plate, 9/6
¼-plate, 12/6

Paraboloid Enlarging Lamp.



THIS Lamp is cut out of a Paraboloid and burns Magnesium Ribbon in one side, the light being distributed over the whole of the Plate from centre to corner, giving crisp, clean, and perfect Enlargements. For ordinary work about four inches of Ribbon is ample.

PRICES.

To cover ¼-plate	...	5/-
,, ,, ½-plate	...	7/6
,, ,, ¼-plate	...	10/-

COLMORE ROW, BIRMINGHAM.

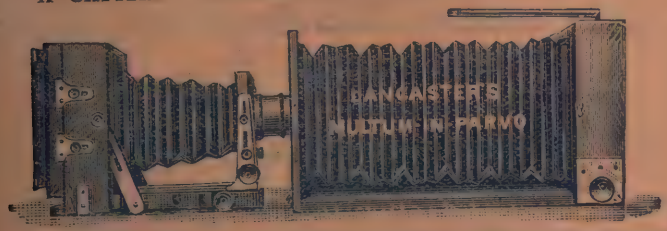
J. LANCASTER & SON, Opticians,

LANCASTER'S MULTUM IN PARVO CAMERA,

FOR ENLARGING AND REDUCING.

THE Multum in Parvo Camera can be used with any ordinary Camera, and may be used for enlarging, copying same size, or reducing. Also for Lantern Transparencies.

A CAPITAL DAYLIGHT ENLARGING APPARATUS.



For Enlarging.—The Negative must be placed in a Dark Slide of ordinary Camera and the enlargement taken in Multum in Parvo, the plate going into the end of Camera.

For Copying same size, the two Cameras must be opened out equally to about twice the length of focus of lens used.

For Reducing.—The Negative must be placed in Multum in Parvo Camera, and Plate put into Dark Slide of ordinary Camera.

PRICES.

To enlarge up to ¼-plate ...	£0	10	6	To enlarge up to 18×16-plate	£3	0	0
,, ,, ½ ,, ...	0	15	0	,, ,, 20×18 ,,	3	15	0
,, ,, ¼ ,, ...	1	1	0	,, ,, 24×20 ,,	4	4	0
,, ,, 10×8-plate ...	1	5	0	,, ,, 30×24 ,,	5	5	0
,, ,, 12×10 ,, ...	1	10	0	,, ,, 36×30 ,,	8	8	0
,, ,, 15×12 ,, ...	2	0	0				

Extra Slides: ¼, **5/-**; ½, **7/6**; ¼, **10/-**; 10×8, **13/6**; 12×10, **16/-**; 15×12, **20/-**

The Amount of Enlargement or Reduction can be varied as required.

LANCASTER'S LANTERN SLIDE MULTUM IN PARVO.



THIS is a well-made Camera, with Double Bellows, Mahogany Slide and Focussing Slide; excellent Lens with Shutter. The Camera can be used for copying prints, photographs, etc., exactly as an ordinary Camera, and for making Lantern slides it is used as represented in woodcut.

Camera, Lens, Flap Shutter, &c., ¼-plate ... **21/-**

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

— LANCASTER'S —

Combination Multum in Parvo



THIS is a well-made Camera with Double Bellows. The Camera and Lens may be used for ordinary work. The Lens is an Achromatic one, specially constructed for enlarging and reducing. Each set consists of Camera, Dark Slide, and Achromatic Lens.

¼ Combination Multum in Parvo, **35/-**

10×8, **42/-** 12×10, **50/-** 15×12, **63/-** 18×16, **105/-** 24×20, **126/-**



The Dark Slide will hold either a Dry Plate or Brom de Paper, and Carriers can be had to carry any sized plate.

EXTRA SLIDES.

¼	...	10/-
10×8	...	13/6
12×10	...	16/-
15×12	...	20/-
18×16	...	30/-
24×20	...	35/-

CARRIERS.

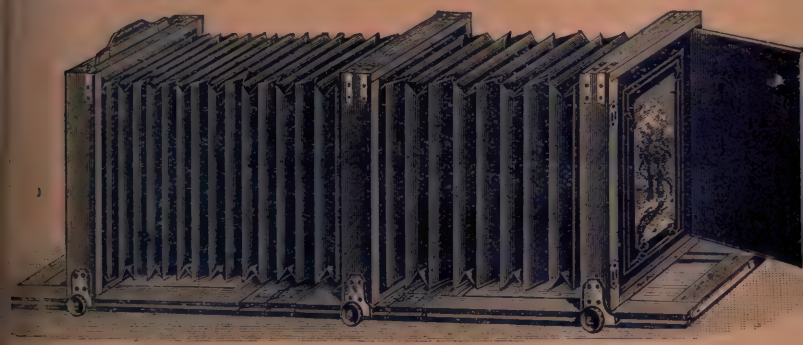
¼, ½, ¼	...	1/ each.
10×8, 12×10		1/6 ,,
15×12	...	1/6 ,,
18×16	...	3/- ,,
24×20	...	3/6 ,,

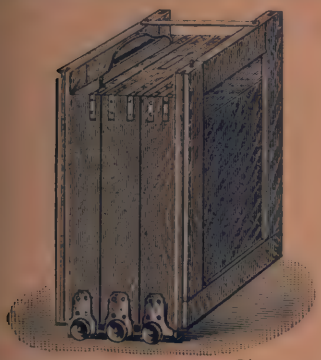
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

..LANCASTER'S..

First Quality Combination Multum in Parvo.





BRASS-BOUND Mahogany Camera, with Double Bellows, Folding Tail Board, superior Achromatic Enlarging Lens, and Carriers down to ¼-plate, making a complete Daylight Enlarging Apparatus.

½-plate	Brass bound Mahogany "Multum in Parvo," with ½ and ¼ Carriers, Achromatic Lens, and Dark Slide				...	£3	10 0
10×8	ditto	ditto	ditto	ditto	...	4	4 0
12×10	ditto	ditto	ditto	ditto	...	5	5 0
15×12	ditto	ditto	ditto	ditto	...	6	6 0
20×16	ditto	ditto	ditto	ditto	...	10	10 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

The "Lancaster" Enlarging Lantern.

THIS Lantern has a pair of 5-in. best Condensers, mounted in Brass, Paraffin Lamp, giving a brilliant light, producing Enlargements crisp up to the edges, and a new formula Double Achromatic Objective, and Carrier for Negative.



427—With 5-in. Condensers, £3 3 0

428—With 6-in. Condensers, £4 4 0



THE "LANCASTER" ENLARGING LANTERN.

It is in all respects a fine Apparatus, everything being of the best possible workmanship and material.

PRICES.

429	Enlarging Lantern, with 6-in. Condensers, &c.							£6	6 0
430	,,	,,	,,	7-in.	,,			£5	8 0
431	,,	,,	,,	8-in.	,,			£9	9 0
432	,,	,,	,,	9-in.	,,			£10	10 0
433	,,	,,	,,	10-in.	,,			£12	12 0
434	,,	,,	,,	11-in.	,,			£15	15 0
435	,,	,,	,,	12-in.	,,			£18	18 0

COLMORE ROW, BIRMINGHAM.

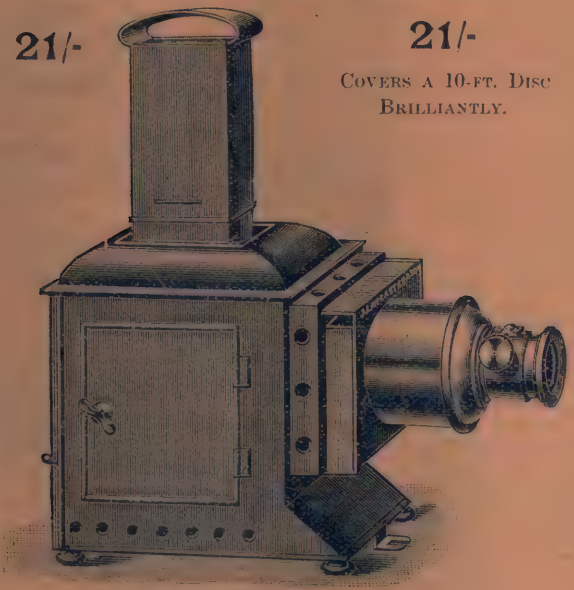
J. LANCASTER & SON, Opticians,

Lancaster's New Lantern

FOR LECTURE AND HOME USE.

21/- 21/-

COVERS A 10-FT. DISC BRILLIANTLY.



No. 438R.

THIS Lantern contains 4-in. Condensers mounted in Brass Cells, Achromatic Front Lenses in Sliding Brass Mount, Three-wick Lamp of good quality, and is in every way an excellent Lantern, giving a 10-ft. disc.

438	21/-
438R.—Superior ditto, with Rack Adjustment	25/-

Metal Cases to carry Lantern, complete, 2/6 and 3/6.
Russian Iron, with Lock and key, 4/6.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

— LANCASTER'S —

Amateur Enlarging and Home Lantern



COVERS A 10-FEET DISC BRILLIANTLY.

AN EXCELLENT LANTERN,

30/-

THESE Lanterns are well made, have best 4-inch Condensing Lenses, and Achromatic Object Lenses. They will enlarge up to 30×24, and will, as a Home Lantern, cover a 10-ft. disc.

438B.R.	Lantern, with 4-inch Condensers, best Achromatic Front, and Four-wick Lamp	£1 10 0
453	Ditto, with Brass Fronts, Rackwork Adjustment, 4-inch Condensers, and best Front Lenses	2 2 0
453a	Ditto ditto with 5-inch Condensers	2 17 6

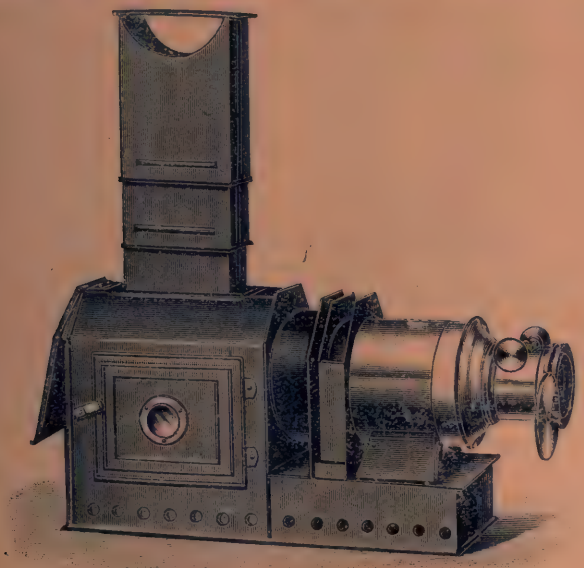
This Lantern will give a good crisp enlargement.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

.. LANCASTER'S ..

New Russian Iron Portable Lantern.



1898 Model ... £2 2s.

THIS is an excellent Lantern, with every modern improvement. It has best 4-inch Condensers, and Achromatic Front Combination, with Flasher and Tinter Slot, Brass Front, 3-wick Lamp, Triple Extension Chimney, closing into smaller space, and sliding into front base of Lantern. Case with handles. The whole when packed measuring only 14 in. × 8 in. × 5½ in., thus being the most compact and convenient Optical Lantern ever introduced.

Price, including Case complete ... ... £2 2s.

Ditto, with 4-wick Lamp ... ... 2 5s.

COLMORE ROW, BIRMINGHAM.

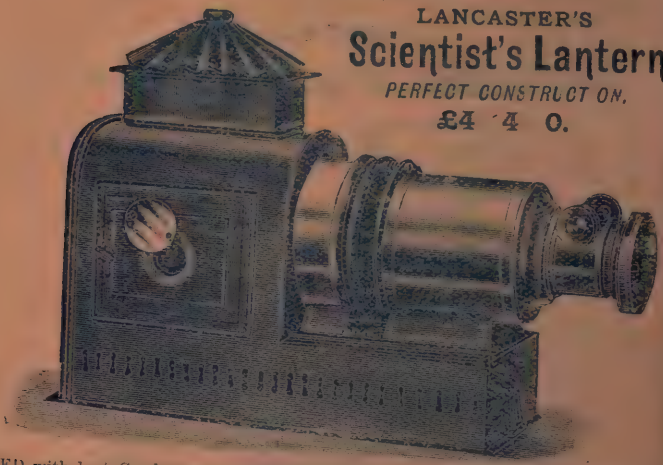
J. LANCASTER & SON, Opticians,

LANCASTER'S

Scientist's Lantern

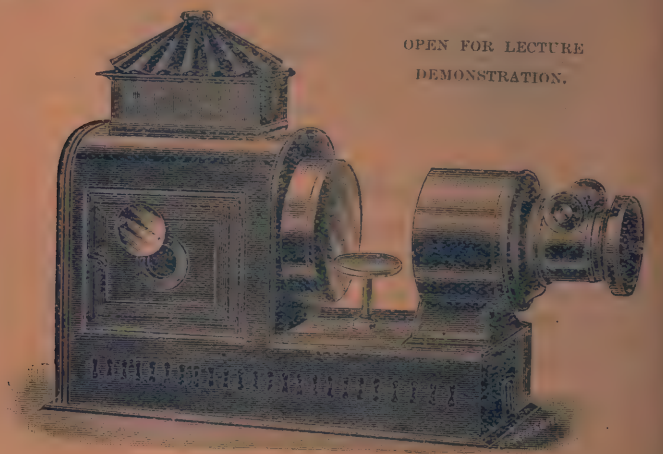
PERFECT CONSTRUCTION.

£4 4 0.



FITTED with best Condensers and finest quality Achromatic Objective New Pattern 4-wick Lamp, with every recent improvement, solid brass front in sections, so that the centre part can be removed for physical experiments. The body of Lantern is made of best quality Russian iron. Lantern, with best 4-wick Lamp, in Metal Case complete, **84/-**

OPEN FOR LECTURE DEMONSTRATION.

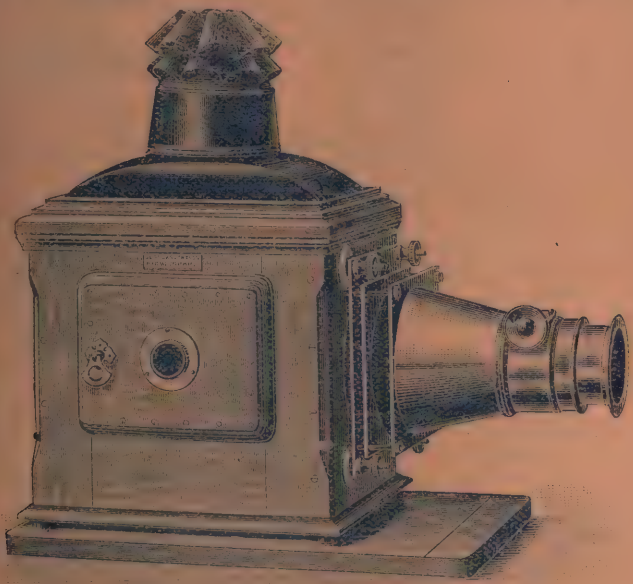


COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,

. . . FIRST QUALITY . . .

OPTICAL LANTERN.



No. 470.

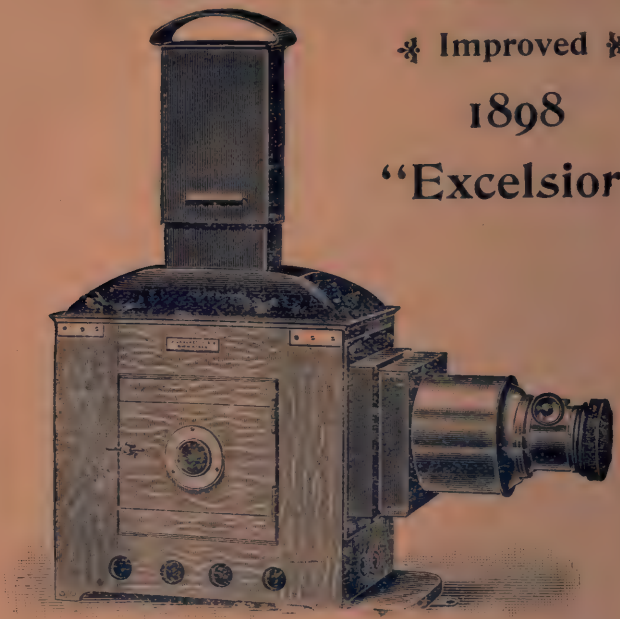
A SUPERB Lantern, with all Modern Improvements. Finest quality Condensers, 4-inch diameter, Triple Achromatic Object Lenses, giving same sized pictures at seven different distances; thus, a 20-ft. disc at any distance between 16 ft. and 70 ft. from the Screen, or seven different sizes at one distance. Built in finest Mahogany, in best possible manner, and on best Mahogany base.

The Whole in Polished Case, with Lock and Key, 126/-

Best Blow-through Gas Jet, Bag, Board, Tubing, &c. ... £3 3 0
Best Oxy-Hydrogen Jet, with pair of Bags, Boards, Tubing, &c. 4 15 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, Opticians,



Improved

1898

"Excelsior."

No. 469. FINEST LANTERN MADE, £3 3 0

THE NEW MODEL "EXCELSIOR" is made of Mahogany, Brass Bound, and has 4-in. best Condensers, mounted in brass, with Ventilation Apertures to prevent Condensing Lens steaming during exhibition, Special Achromatic Front, with large Back Combination, giving brilliant definition and covering well a twelve-feet disc, with crispness from centre to margin.

Our New Four-wick Lamp, with the light concentrated into the smallest possible space, giving brilliant illumination; new system of ventilation, in which air currents enter between the wicks—producing maximum light from hydro-carbons burnt.

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Our New Dissolver, giving the most perfect dissolving effects possible with a Single Lantern	0 5 0
New Dissolving Slide, to use with above	0 3 6
Achromatic Microscope, adaptable to any Lantern, with double combination power, etc.	1 1 0
Ditto ditto ditto ditto three powers	2 2 0
Jet Tray for Limelight	0 2 0
Set of Apparatus for Limelight, to fit "Excelsior" ... £3 3 0 and	5 5 0

No. 469 B.

IMPROVED "EXCELSIOR." This is a new Lantern on the model of "Excelsior," but with considerable improvements. The whole of the Front Stages are of strong, well finished brass. The Lamp is one of our latest productions, and the Front Combination is ur new Objective, giving different sized pictures at one distance, with perfect definition.

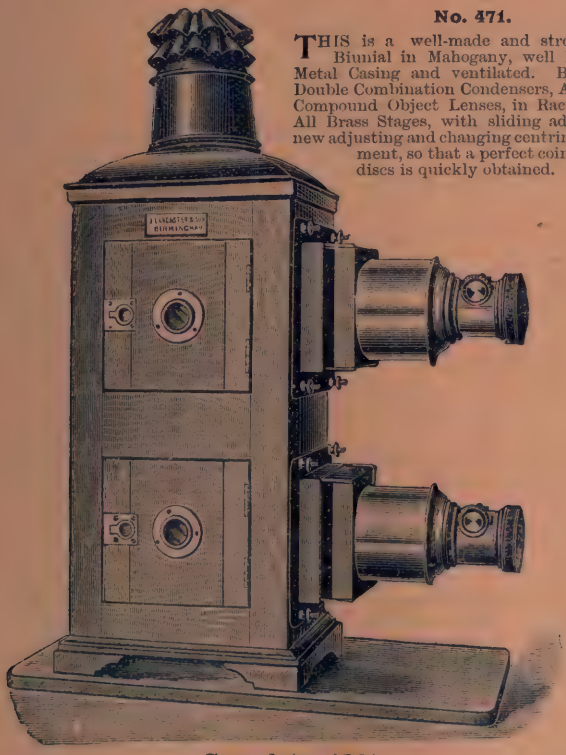
PRICE COMPLETE, IN POLISHED BOX, WITH LOCK AND KEY, 84/-

This Lantern is the most compact and perfect ever introduced.

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BIUNIAL LANTERN



No. 471.

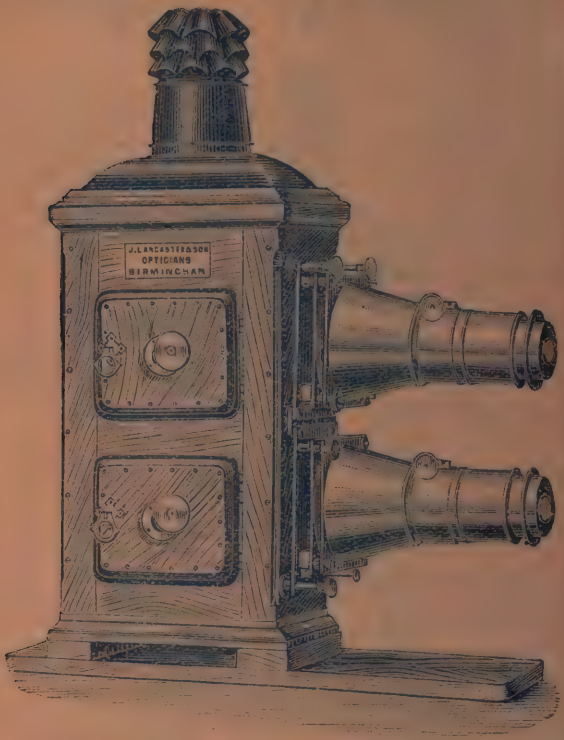
THIS is a well-made and strongly-built Biunial in Mahogany, well lined with Metal Casing and ventilated. Best 4-inch Double Combination Condensers, Achromatic Compound Object Lenses, in Rack Mounts. All Brass Stages, with sliding adjustment; new adjusting and changing centring arrangement, so that a perfect coincidence of discs is quickly obtained.

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Pair Blow-through Jets, Cog-wheel Lime Adjustment, Gas Bag, Board, Retort, Purifier, Dissolver, &c.	£4	4	0
Ditto Oxy-Hydrogen Jets, Platinum Points, pair of Bags, Boards, &c., complete	6	6	0
Strong Polished Cabinet, with drawer, &c., to carry Biunial, &c.	1	1	0

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No. 472.

472	First Quality Mahogany Biunial, with best 4-in. Condensers, Triple Achromatic Objectives mounted in Brass Fronts, Cones and Sliding Tubes, giving a 20-ft. disc at any distance from screen. In Cabinet, with drawers and space for all extras	£12 12 0
473	Pair Blow-through Jets, Cog-wheel Lime Adjustment, Gas Bag, Board, Retort, Purifier, Dissolver, &c. ...	4 4 0
474	Ditto, Oxy-Hydrogen Jets, Platinum Points, pair Bags, Boards, &c., complete	6 6 0

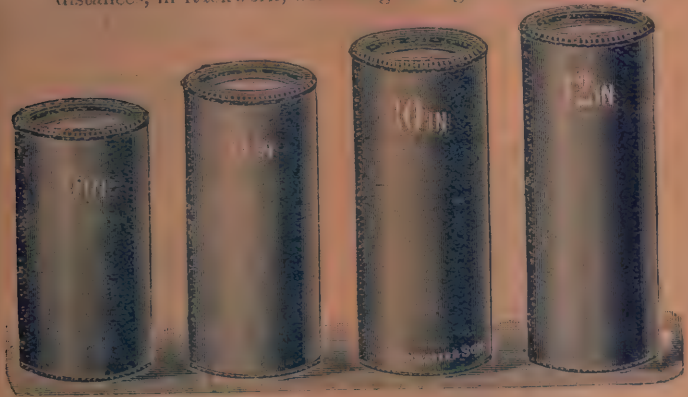
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447 446 445

444	Achromatic Double Combination Sliding Fronts ...	£0 10 6
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446	Superior ditto ditto	0 15 0
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Extra Combinations ... ... each 0 5 6

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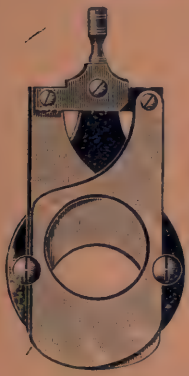
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9-ft. ditto, ditto **2 5 0**

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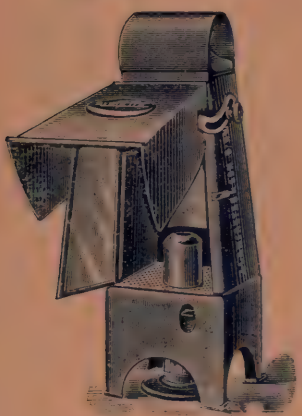


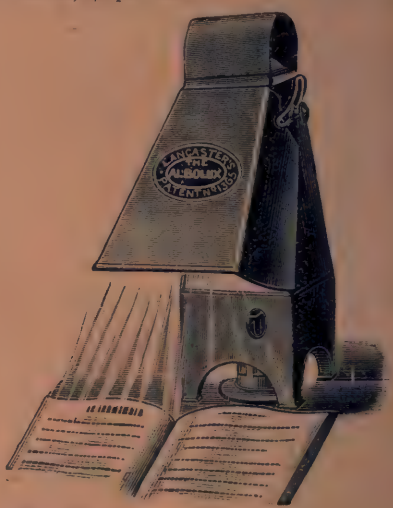


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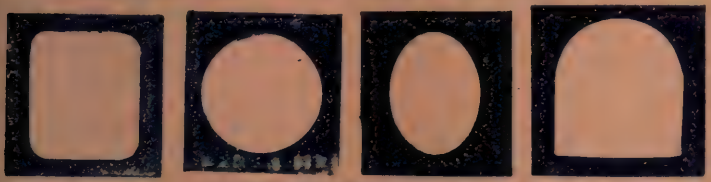
No. 1	Lantern, complete	...	£0	2	6
No. 2	,, ,,	...	0	3	6
No. 3	,, ,,	...	0	6	0
No. 4	,, ,,	...	0	8	6
No. 5	,, ,,	...	0	10	6
No. 6	,, 3-in. Condensers		0	15	0
No. 7	,, 3½-in. ,,	...	1	1	0

..Lantern Slides for above Lanterns..

No. **1**, **2**/- per dozen. No. **2**, **3**/**6** per dozen. No. **3**, **5**/- per dozen. No. **4**, **7**/**6** per dozen. No. **10**, **10**/**6** per dozen.

THREE OR FOUR PICTURES ON EACH SLIDE.

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PAPER MASKS, 3¼-in. Square.
In Shapes—OBLONG CUSHION, CIRCLE CUSHION, OVAL, and DOME.
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,, 15-ft. ,, ...	**84**/

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455	Oxy-Hydrogen Blow-through Jets, of good quality	0 12 6
456	Best Oxy-Hydrogen Blow-through Jet, with Rack Adjustment to Lime Cylinder	0 15 0
457	Oxy-Hydrogen High-pressure Jet, with Lancaster's Packing, and Platinum Nozzle	0 18 0



458	Lancaster's Best High-pressure Jet, with Safety Packing in Chamber, producing perfect admixture of gas and pure combustion in flame, with Rack-work Adjustment to Lime Cylinder...	£1 1 0
460	Three-wick Lamps	0 10 6
461	Four ,, ,, ...	0 13 6
462	Argand Gas Burner, mounted for Lantern	0 10 6
463	Gas Bags 25/- 30/- 42/-	3 3 0
464	Pressure Boards, per pair ... ... from	1 0 0
465	Retorts for Oxygen...	0 8 6
466	Six-way Tap Disolvers	0 15 0

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5-in.	,, ...	21/-	10-in.	,, ...	110/-
6-in.	,, ...	35/-	11-in.	,, ...	140/-
7-in.	,, ...	50/-	12-in.	,, ...	180/-

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450	Tin Bodies for Lanterns, from...	0 10 0
451	Mahogany Bodies for Single Lanterns...	0 15 0
452	Ditto ditto for Biunials, from	1 15 0
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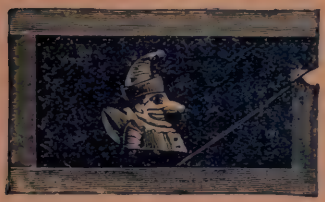
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9 Tiger
10 Picnic and Boa Constrictor
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12 Father Christmas and Plum-pudding
13 When shall We Three Meet Again
14 Man Playing Flute
15 Autumn Manœuvres ; Heads shot off
16 Man Swallowing Rats
17 Punch and Family
18 Woman with Growing Nose
19 A White Favour
20 Davenport Brothers Outdone
21 The Colorado Beetle
22 Indian Brave, rolling eyes
23 Ally Sloper
24 Man on Stool Smoking
25 Man Whistling
26 Lady on Kicking Donkey
27 Pickwick : Good-night
28 Cow Tossing Dog
29 Sailor Smoking
30 Scotchman Dancing
31 Dog Jumping through Hoop
32 The Sick Dog ; " Who said Rats "
33 Cattle Show First Prize
34 A Pretty Pair of Spectacles
35 Temperance Meeting.
36 Stepping into Father's Shoes
37 Donkey throwing Boy into Water
38 Long and Short Soldier
39 Girl Dancing
40 Oyster Woman
41 Fine Mutton Pies
42 Clown and Policeman
43 Turk's Head, moving eyes
44 Ginger Pop
45 Cock Picking Corn
46 Crossing Sweeper
47 Irish Stew
48 Speck'd Taters (Spectators)
49 Clown, moving eyes
50 Fairy
51 A Family Umbrella
52 Real Scotch
53 Dancing Sprite
54 Schoolmaster, " Silence ! "
55 Girl Swinging
56 Election Day
57 Cinderella and her Godmother
58 Real Old Tom
59 Chinaman and Tea Chest
60 Performing Acrobat
61 Pantaloon Dancing
62 Raw Recruit and Polished Soldier
63 Soldier with Umbrella
64 A Shutter Up
65 Water Lilies
66 Clown Throwing Baby in the Air
67 Boy and Schoolmaster
68 Soldier on Chair Smoking
69 Blue Beard and Fatima
70 Countryman, moving eyes
71 Noses to Sell
72 Punch and Judy Show
73 Man Reading *Times*
74 Gin and Claret
75 Great Fall in Eggs
76 Monkey Riding Cat
77 Turtle Soup
78 Policeman Chasing Dog

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[*See pages* 1317 *to* 1334; *also Outside Cover.*

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THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC

AND

Photographer's Daily Companion

FOR

1898.

EDITED BY THOMAS BEDDING, F.R.P.S.

ADVERTISERS' INDEX, see pp. 1133 to 1136.
POSTAL AND TELEGRAPHIC ADDRESSES, see pp. 1139 to 1146
CONTENTS, see pp. 1083 to 1088.

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PREFACE.

LAST year's volume of THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC brought me so many expressions of appreciation from its readers in all parts of the world that no other inducement was needed to guide me in compiling the present issue on as nearly as possible identical lines. The rearrangement of the contents then adopted has consequently been adhered to on this occasion. Some small additions to the Formulæ section have been made, and I have endeavoured in the remaining divisions of the book to epitomise as fully as possible all the important advances and improvements in practical photography that have taken place during the past year.

Lack of space has obliged me to omit many interesting articles, while other considerations have also necessitated the neglect of numerous suggestions that have reached me from time to time, having for object the enhancement of the ALMANAC'S usefulness.

To Messrs. Wellington & Ward, for the frontispiece; to Messrs. Waterlow; to the London Stereoscopic Company; and to Messrs. Smedley & Co., my thanks are due, and are hereby tendered, for the illustrations interspersed in the text matter.

The miscellaneous articles, by over a hundred contributors, supply a wealth of useful and informative reading; and I beg the authors to accept my warmest acknowledgments of their support. The writing of this brief preface to the ALMANAC is a task that is as pleasant as it is simple, for it is the one opportunity in the year that falls to me of adopting the first person singular towards a world-wide circle of readers of THE BRITISH JOURNAL OF PHOTOGRAPHY and the ALMANAC, and of enabling me to say that I wish them and photography every prosperity in the New Year.

THOMAS BEDDING,
Editor.

London, November, 1897.

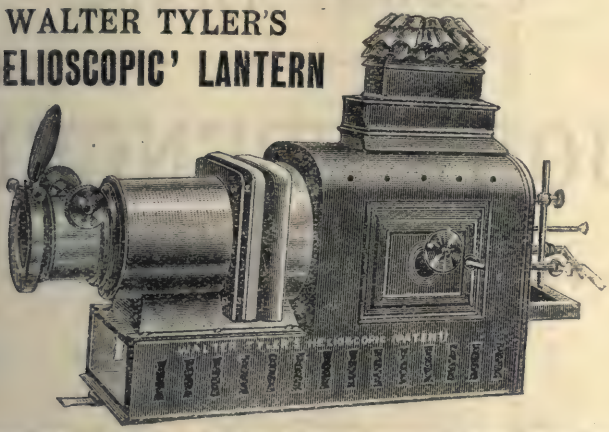
INDEX TO ADVERTISERS, see pp. 1133–1136.

POSTAL AND TELEGRAPHIC ADDRESSES, see pp. 1139–1146.

CONTENTS, see pp. 1083–1088.

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† *See pages 99 to 106.*

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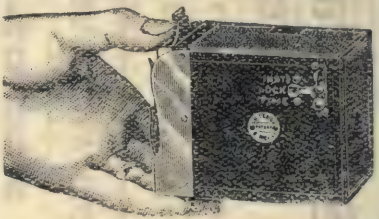
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Yours sincerely, T. J. H.

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THE 1898 MODEL

Latest and most improved method of loading and unloading in Daylight (no dark-room necessary).

PLEASE NOTE NEW ADDRESS—

Henry J. Redding & Gyles

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Dealers and Manufacturers of Optical, — — Electrical, and Photographic Apparatus,

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Shippers and the Trade supplied.



— FROM A LUZOGRAPH. —

[See following pages.

Write at once or the **'LUZO' Illustrated Booklet,** post free.



THE 'LUZO' IS ALWAYS READY FOR IMMEDIATE USE.

SOLE MAKERS—

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— THE —

'LUZO'

Is not a Plaything,

but a Practical Instrument of the most complete form.

BEST QUALITY WORKMANSHIP AND FINISH.

For use at Home and Abroad.

WILL STAND ALL CLIMATES.

Do not fail to see it before purchasing any other, or **you will regret it.**

[*See preceding and following pages.*

TO AMATEURS AND THE TRADE.

SPECIAL NOTICE.

BEING aware of the difficulty hitherto experienced by Amateurs and others in getting their work **done Quickly**, we have devoted particular attention to these departments, and are now in a position to undertake the development of any number of films or plates in **two days.**

In the Printing Department the work is executed with equal dispatch. Prints in all styles are supplied from customers' negatives in a few days, except of course during extremely dull weather, when a reasonable allowance must be made.

To Develop a batch of Films or Plates, and supply Proofs on highly-glazed Gelatine Chloride Paper, our usual time is four or five days, allowing a little margin for pressure of business, &c. Customers can always rely upon our completing such orders within **One Week.**

The best possible results obtained in every case, as none but experienced hands are employed.

DEVELOPING, PRINTING, &C., QUICKLY DONE.

CHARGES MODERATE.

POCKET KODAK FILMS DEVELOPED, and One Dozen Glazed P. O. P. Prints for - - - 2/=

'LUZO,' FRENA, KODAK, and all other PLATES AND FILMS DEVELOPED, &c., at equally LOW PRICES.

LANTERN SLIDES
MADE FROM ANY SUBJECT.

ENLARGING, MOUNTING, FRAMING, &c.
ALBUMS MADE UP.

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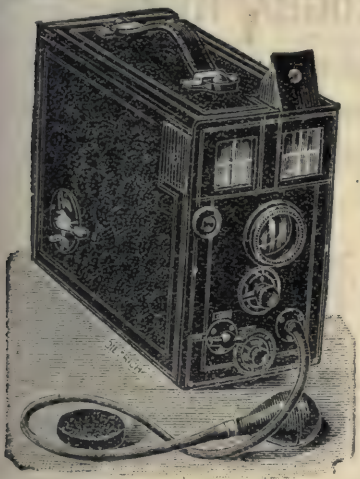
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[*See preceding and following pages.*

THE NEW WEST-END DEPOT.



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PHOTOGRAPHIC REQUISITE.

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A Variety of Hand Cameras for Plates and Films from 21s.

Portable Stand Cameras with all latest improvements, . . Highest quality, . . Workmanship and Finish.

Complete Sets for Tourists.

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OUTFITS FOR FOREIGN EXPEDITIONS A SPECIALITY.

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Photographic Lenses of all kinds, agents for all the Principal makers.

All Brands of Dry Plates, Films, and Papers at makers' prices.

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Enlarging Apparatus, Photo Micrographic Cameras.

Photo Micrographs made from preparation.

Lantern Slides made to order.

Lime-Light Apparatus, with Operator supplied for Lectures.

Dark Rooms fitted up at Customers' residences. Estimates free.

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DEALERS AND MANUFACTURERS OF OPTICAL, ELECTRICAL, AND PHOTOGRAPHIC APPARATUS.

Sole Proprietors, Patentees and Manufacturers of the 'LUZO.'

Shippers and the Trade Supplied. **3 ARGYLL PLACE, LONDON, W.**

[*See preceding pages.*

MOST PHOTOGRAPHERS

know that to obtain fine definition to the margins of the plate with a Rapid Rectilinear or Symmetrical Lens, of whatever make, stopping down and therefore lengthened exposures are unavoidable; but

COOKE LENSES

can give sharp definition at the extreme corners of the plate with large apertures, thus making photography possible in dull lights.

COOKE LENSES

have ONLY THREE GLASSES, and are at once
THE BEST AND SIMPLEST ANASTIGMATS.

For Prices, see next page.

TAYLOR, TAYLOR, & HOBSON,

Slate Street Works, LEICESTER,

AND

FARADAY HOUSE, 8 & 10 CHARING CROSS ROAD, LONDON, W.C.

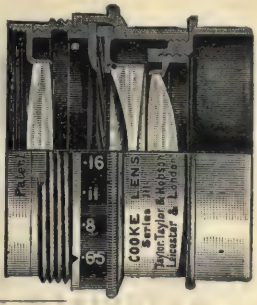
[*See following page.*

Sectional View of a

COOKE LENS

showing its three simple glasses and the screw adjustments by which final perfection is obtained.

(See preceding page.)



PRICES.

	Approx. equivalent focus in inches.	With large apertures to cover plates.	When stopped down, to cover plates up to	PRICES. Lens with improved Iris Diaphragm.	Patent Flanges extra, each.
SERIES III. Full Aperture, F/6·5.	4	$3\frac{1}{4} \times 3\frac{1}{4}$	$4\frac{1}{4} \times 3\frac{1}{4}$	£3 12	2/-
	5	$4\frac{1}{4} \times 3\frac{1}{4}$	5 × 4	4 0	2/-
	5·5	$4\frac{1}{4} \times 3\frac{1}{4}$	$6\frac{1}{2} \times 4\frac{3}{4}$	4 5	2/-
	6	5 × 4	$6\frac{1}{2} \times 4\frac{3}{4}$	4 10	2/-
	7·5	$6\frac{1}{2} \times 4\frac{3}{4}$	10 × 8	5 10	2/-
	8·25	7 × 5	10 × 8	6 5	2/-
SERIES V. Full Aperture, F/8.	9	8 × 5	12 × 10	£7 10	2/-
	11	$8\frac{1}{2} \times 6\frac{1}{2}$	15 × 12	8 10	2/-
	13	10 × 8	17 × 15	10 0	2/-
	16	12 × 10	18 × 16	15 0	2/6
	18	15 × 12	24 × 20	18 10	3/-

TAYLOR, TAYLOR, & HOBSON,

Slate Street Works, LEICESTER,

AND

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. . . THE . . .

AUTOTYPE COMPANY,

LONDON.

DEPOTS in the principal European Capitals, in America, Canada, and Australia.

PERMANENT AUTOTYPE TISSUES and MATERIALS for the CARBON PROCESS.
Complete Price List with Appendix. Hints and Maxims to Carbon Printers. **Post Free on Application.**

The A.B.C. GUIDE to AUTOTYPE PERMANENT PHOTOGRAPHY. The Standard Handbook to the process. 100 pages, two illustrations, cloth, gilt. **Post Free 2s. 6d.**

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AUTOTYPE PERMANENT ENLARGEMENTS
Of the highest excellence (Trade list to Professional Photographers only).

The Company's productions have been awarded 28 Prize Medals and Diplomas at various exhibitions.
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OF

REGD. TRADE MARK.

ILFORD

Photographic Goods.

19 YEARS' REPUTATION FOR

EXCELLENCE

UNIFORMITY

CHEAPNESS

MANUFACTURED SOLELY BY

THE BRITANNIA WORKS CO.

LIMITED,

ILFORD, LONDON, E.

TELEGRAPHIC ADDRESS "PLATES, ILFORD."

TELEPHONE No. 14 BARKING,

For "BACKED" PLATES see page 526.

UNIFORM PRICES FOR ALL QUALITIES.

Ilford Plates

	COLOUR OF LABEL.
Ordinary	Yellow
Empress	Salmon
Special Rapid	Red
Chromatic	Green & white
Process	Black & white
Half Tone	White & Red
Special Lantern	Blue & white
Alpha Lantern	Red & white

PRICES PER DOZEN.

$3\frac{1}{4} \times 3\frac{1}{4}$	... ...	...	1/0
$4\frac{1}{4} \times 3\frac{1}{4}$ ($\frac{1}{4}$ plate)	... ...	. .	1/0
5×4	... ...		1/7
$6\frac{3}{4} \times 3\frac{1}{4}$	... ...		2/0
$6\frac{1}{2} \times 4\frac{1}{4}$	.. ..		2/2
$6\frac{3}{4} \times 4\frac{3}{4}$ ($\frac{1}{2}$ plate)	... ...		2/3
$7\frac{1}{2} \times 5$	... ...		3/5
8×5	... ...		3/9
$8\frac{1}{2} \times 6\frac{1}{2}$ (whole plate)	... ...		4/3
9×7	... ...		5/0
10×8	... ...		7/3
12×10	... ...		10/6
15×12	... ...		18/0
18×16	. . ..		32/6
20×16	... ...		36/0
22×18	... ...		48/0
24×20	... ...		59/0

All other sizes to order. Larger sizes than above are subject to special prices. $8\frac{1}{2} \times 6\frac{1}{2}$ *are packed in half-dozens, to order, at* 1/- *per dozen extra.* 10×8 *and upwards packed in* $\frac{1}{2}$ *dozens without extra charge.*

Postage Extra.

ALL Ilford Plates

Are alike in Price, Quality, and Uniformity.

They differ only in Speed.

Proportionate Speed of Plates, &c., in seconds exposure required:

Ordinary & Chromatic.	Empress.	Special Rapid.	Process.
1	½	¼	8

Half-Tone.	Special Lantern.	Rapid Bromide.	Slow Bromide
1½	20	5	25

For everyday work, both in studio and field with either slow or instantaneous exposures, the

☛ ILFORD ORDINARY

are recommended.

For dull weather and for rapid exposures in studio or with hand cameras the

☛ ILFORD EMPRESS are best

For quick shutter exposures in studio and for very dull days the

☛ ILFORD SPECIAL RAPID

Plates will be found desirable.

For Landscape Work, where greens and yellows predominate, and for copying pictures, for cloud and snow subjects, and microscopical photographs

☛ ILFORD CHROMATIC

Plates are necessary to obtain the best results. (See Pamphlet.)

Ilford 'Special' Lantern Plates

Give slides of unusual brilliancy, clear high-lights and transparent shadows. They can be used either for Contact or Reduction Printing, with a considerable range of tone—FROM COLD TO WARM BLACK.

Ilford 'Alpha' Lantern Plates

Are for Contact Printing only, and give slides of any colour, from greenish black through all shades of brown, red and purple to bright blue.

For full Particulars of Working see our Pamphlet:

"ILFORD LANTERN PLATES, AND HOW TO USE THEM."

SENT POST FREE.

For Photo-Mechanical Work,

SPECIAL PAMPHLET FREE TO PROCESS WORKERS.

THE ILFORD "PROCESS" PLATE

Is the Best DRY Plate ever made for LINE work

THE "HALF-TONE" PLATE

Is specially recommended for HALF-TONE work.

Ilford Films

The advantages of Films, in lightness, portability and freedom from breakage, are undoubted. For Travellers they are specially adapted.

Empress (Salmon Packet.)

More than **twice as fast** as Ilford Ordinary Plates.

Special Rapid (Red Packet.)

More than **Four times as fast** as Ilford Ordinary Plates.

PRICES PER DOZEN.

	Empress.	Special Rapid.
$4\frac{1}{4} \times 3\frac{1}{4}$	1/6 ..	.. 2/0
5 × 4	2/6 ..	.. 3/0
$6\frac{1}{2} \times 4\frac{3}{4}$	3/8 ..	.. 4/6
$8\frac{1}{2} \times 6\frac{1}{2}$	6/6 ..	.. 8/0
10 × 8	10/0 ..	.. 12/0

Postage Extra.

ILFORD P.O.P.

REGISTERED TRADE MARK.

A Gelatino-chloride Printing-out Paper of exquisite quality.

Used throughout the World.

It is made in five Varieties.

Viz:

GLOSSY surface:

WHITE, MAUVE, PINK,

SPECIAL { For producing Soft Prints from Hard Negatives.

MATT surface:

WHITE only.

ALL THE SAME PRICE

See next page.

PRICES OF

ILFORD P.O.P.

REGISTERED TRADE MARK.

TUBES.

Inches.			Price	With Postage.
	2	Sheets	1/4	.. 1/6
	6	,, ...	4/0	.. 4/3
24½ × 17	12	,, .. .	7/6	.. 7/10
	24	,, 1 quire (in 2 tubes)..	15/0	.. 15/6
24 × 20	24	,, ,, ..	17/6	.. 18/0

PACKETS.

3⅛ × 3⅜	.. 47	Pieces	1/0	..	1/1
3½ × 3½	.. 40	,, ...	1/0	..	1/1
4¼ × 3¼	.. 36	,, .. .	1/0	..	1/1
5 × 4	.. 24	,, ...	1/0	..	1/1
6 × 4¼	.. 24	,, ...	1 0	..	1/2
6½ × 4¾	.. 16	,, .. .	1/0	..	1/2
7½ × 5	.. 12	,, .. .	1 0	..	1/2
8½ × 6½	.. 9	,, .. .	1/0	..	1/2
10 × 8	.. 12	,, ...	2/0	..	2/3
12 × 10	.. 12	,, .. .	3/0	..	3/3

BOXES.

3⅜ × 2⅜	..144	,, ...	1/10	..	2/-
3½ × 2¼	..144	,, ...	1/8	..	1/10
5¾ × 4	..144	,, ...	5/0	..	5/3
5½ × 4	..144	,, ...	4/8	..	4/11
8 × 6	..144	,, ...	12/0	..	12/5

"Ilford P.O.P. & How to Use it." Illustrated, 40pp Post Free.

Ilford Bromide Paper.

DELIGHTFUL

MATT SURFACE.

THE FIRST

INTRODUCED AND

NEVER EQUALLED.

MADE IN FOUR VARIETIES:

ALL THE SAME PRICE.

Rough Slow (R.S.)
Rough Rapid (R.R.)
Smooth Slow (S.S.)
Smooth Rapid (S.R.)

PRICES

1¼ × 3¼	6d. per dozen Sheets.
5 × 4	9d. ,, ,,
6½ × 4¾	1/1 ,, ,,
8 × 5	1/5 ,, ,,
8½ × 6½	1/11 ,, ,,
10 × 8	2 9 ,, ,,
12½ × 10½	4/- ,, ,,
15½ × 12½	6/6 ,, ,,
18 × 15	5/3 per ½-doz. Sheets.
20 × 16	5/9 ,, ,,
23 × 17	6/9 ,, ,,
24½ × 19	7/6 ,, ,,
Rolls.	
10-ft. × 24½-in.	8/6 each
10-ft. × 34-in.	12/- ,,
20-ft. × 34-in.	24/- ,,

Postage extra.

SOMETHING NEW.

Ilford

PLATINO-MATT-SURFACE

Bromide Paper.

ITS CHARACTERISTICS ARE

SPECIAL AND DELIGHTFUL.

RICH VELVETY SURFACE.
HEAVY PAPER.
BRILLIANT WHITES.
RICH BLACK TONES.

Made in one variety only, Smooth Rapid.

Prices as for Ilford Ordinary Bromide Papers,
See opposite page.

ILFORD BROMIDE OPALS.

THESE are made both *rapid* and *slow*, and have all the good qualities of the Bromide Paper, with the special characteristics of Opal glass.

	PER DOZEN.
$4\frac{1}{4} \times 3\frac{1}{4}$ ($\frac{1}{4}$ plate)	1/6
5 × 4	2/6
$6\frac{1}{2} \times 4\frac{3}{4}$ ($\frac{1}{2}$ plate)	3/8
$7\frac{1}{2} \times 5$	5/3
$8\frac{1}{2} \times 6\frac{1}{2}$ (whole plate)	6/6
9 × 7	8/-
10 × 8	10/-
12 × 10	16/-
15 × 12	24/-

Postage extra.

PACKED IN $\frac{1}{2}$ DOZENS.

PRICE LIST of CONTINENTAL SIZES

OF

ILFORD

PLATES & P.O.P.

REGISTERED TRADE MARK.

PLATES, per Dozen.

Centimètres	All Plates.	Empress Films.	Special Rapid Films.
	s. d.	s. d.	s. d.
9 × 12 ..	1 4	2 3	2 10
12 × 15 ..	2 3	3 5	4 3
12 × 16½ ..	2 3	3 8	4 6
13 × 18 ..	2 8	4 3	5 3
18 × 24 ..	5 0	8 3	10 3
21 × 27 ..	7 8	11 0	13 6
30 × 40 ..	20 0	27 0	33 9
40 × 50 ..	34 0	51 0	63 9

P.O.P. per Packet.

9 × 12	24 pieces	0 10
12 × 16½	24 ,, ...	1 4
13 × 18	24 ,, ...	1 8
18 × 24 ..	12 ,, ...	1 5

Postage extra.

ILFORD

Exposure Meter.

(Professor Scott's Patent.)

PRICE
5/-



Post Free,
5/2.

A common-sense and practical aid to correct exposure.

ILFORD

Isochromatic Screen and Holder.



	1-in.	3-in.	4-in.
Screen and Holder ...	7/6	15/-	28/-
In case, post free ...	7/9	15/3	28/3
Screen alone ...	4/-	10/-	17/6
post free ...	4/3	10/3	17/9
Frame alone ...	3/-	4/-	7/6
post free ...	3/3	4/3	7/9

Can be had from all Dealers.

The Larger sizes are made with square glasses and frame.

When the subject reflects a large proportion of green and yellow rays, or when the light is hazy or yellowish, the relative speed of the Iso plates is much higher.

The screen glasses are made in two tints – No. 1 for the average everyday work, increases the exposure about three times; No. 2 for copying and extreme subjects, increases the exposure about six times. The larger screens are made square, instead of circular.

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(BY C. H. BOTHAMLEY, F.C.S., F.I.C.)

200 pp. Illustrated.

SEVENTY THOUSAND SOLD.

The most popular and useful photographic Text-book ever issued.



CLEAR, SIMPLE, CONCISE, AND EXHAUSTIVE.



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Photographic Scraps,

THE ILFORD JOURNAL.
CIRCULATION 35,000 MONTHLY.

Full of information & guidance to all classes of photographers,

Gratis from all Dealers. or free by post for one year
on receipt of six penny stamps.

In addition we publish the following PAMPHLETS, and shall be happy to forward copies of each or all to anyone, on receipt of one Penny Stamp:

Ilford P.O.P: How to use it.

Ilford CHROMATIC PLATES: How & why to use them.

Ilford EXPOSURE METER: How to use it.

Ilford LANTERN PLATES: How to use them.

Ilford BROMIDE PAPER and How to use it.

Or copies can be cttained free from all Dealers.

Ilford Plates, Backed

At 1/-

PER DOZEN.

For $\frac{1}{4}$ Plates.

ILFORD ORDINARY PLATES

are supplied to order

A SOLUBLE BACKING.
EASY TO REMOVE
AND
DOES NOT CHIP.

BACKED, at

USUAL PRICES

PRICES.

Quarter Plate,	Half Plate,	Whole Plate,	
1/-	**2/3**	**4/3**	**per doz.**

NOTE.—Empress and Special Rapid Plates are supplied backed at the following Prices:—$\frac{1}{4}$-plate, **1/3**; $\frac{1}{2}$-plate, **2/9**; $\frac{1}{1}$, **5/-**; 10 × 8, **8/3**; 12 × 10, **11/6**; 15 × 12, **20/-**; 20 × 16, **39/-**.

Postage extra.

ROSS' CELEBRATED LENSES

AND

ZEISS' AND GOERZ' ANASTIGMATS, &c.

See pages 35 to 98.

Index to Contents, pages 1083 to 1088.

Index to Advertisements, pages 1133 to 1136.

1898

NOTICE OF REMOVAL.

THE OFFICES of the 'BRITISH JOURNAL OF PHOTOGRAPHY,' and 'British Journal Photographic Almanac,' will be

REMOVED ON JANUARY 1st, 1898,

to Larger and more Convenient Premises at

24 Wellington Street, Strand, London.

JANUARY.

S	M	T	W	T	F	S
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2	3	4	5	6	7	8
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FEBRUARY.

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18	19	20	21	22	23	24
25	26	27	28	29	30	31

POSTAL AND TELEGRAPHIC ADDRESSES, 1139 to 1146.

For Several Important New Series of

ROSS' ZEISS' & GOERZ' LENSES

See pages 35 to 98.

ROSS Ltd., 111 New Bond Street, London, W.

CORNER OF BROOK STREET.

The 'LONDON' PLATES

Prices and Particulars of all Dealers or direct from the Manufacturers,

WRATTEN & WAINWRIGHT,

CROYDON, SURREY.

JANUARY.

D. M.	D. W.	Remarkable Events.	Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. Morn.	Moon. Sets. Morn.
1	S		8 9	4 0	11 36	1 57
2	S	2nd Sunday after Christmas	8 8	4 1	11 55	3 8
3	M	Prof. J. W. Draper d. 1882	8 8	4 2	After	4 17
4	Tu		8 8	4 3	0 55	5 24
5	W		8 8	4 4	1 38	6 23
6	Th	Epiphany [(Paris), 1839	8 8	4 5	2 33	7 13
7	F	Daguerreotype com. to Acad. of Sc.	8 7	4 6	3 36	7 53
8	S	○ 0.24 M.	8 7	4 8	4 46	8 23
9	S	1st Sunday after Epiphany	8 6	4 9	5 59	8 47
10	M		8 6	4 11	7 13	9 7
11	Tu		8 5	4 12	8 27	9 21
12	W		8 4	4 13	9 42	9 36
13	Th	William Bedford d. 1893	8 3	4 15	10 58	9 50
14	F		8 3	4 17	Morn	10 5
15	S	G. W. Simpson d. 1880. (3.45 A.	8 2	4 18	0 17	10 22
16	S	2nd Sunday after Epiphany	8 1	4 20	1 39	10 43
17	M		8 0	4 21	3 4	11 11
18	Tu	E. Lacan d. 1879. Rejlander d. 1875	7 59	4 23	4 28	11 52
19	W		7 58	4 24	5 43	After
20	Th	Photo. Soc. of Lond. f. 1853	7 57	4 26	6 43	2 3
21	F	Fox Talbot b. 1800	7 56	4 28	7 27	3 30
22	S	Sir W. Newton d. 1869. ● 7.25 M.	7 55	4 30	7 59	4 59
23	S	3rd Sunday after Epiphany	7 54	4 31	8 22	6 26
24	M		7 53	4 33	8 39	7 49
25	Tu		7 51	4 35	8 55	9 9
26	W		7 50	4 37	9 9	10 25
27	Th	[1863	7 48	4 38	9 24	11 39
28	F	Photo-sculpture pat. by Willème,	7 47	4 40	9 40	Morn
29	S	) 2.33 A.	7 46	4 42	9 59	0 52
30	S	4th Sunday after Epiphany. Fox	7 45	4 44	10 23	2 4
31	M	[Talbot's first c. to Roy. Soc. 1839	7 43	4 45	10 53	3 11

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[*See page* 558.

THORNTON-PICKARD
TIME & INSTANTANEOUS
SHUTTER
PRICE FROM 18/6.
See pages 1165 *to* 1220.

JANUARY.

D. M.	D. W.	MEMORANDA.
1	S	
2	S	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
3	M	
4	Tu	
5	W	
6	Th	
7	F	
8	S	
9	S	
10	M	
11	Tu	
12	W	
13	Th	
14	F	
15	S	
16	S	
17	M	
18	Tu	
19	W	
20	Th	
21	F	
22	S	
23	S	
24	M	
25	Tu	
26	W	
27	Th	
28	F	
29	S	
30	S	
31	M	

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FEBRUARY.

D M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises.	MOON. Sets.
1	Tu		7 41	4 47	11 33	4 15
2	W		7 40	4 49	After	5 8
3	Th		7 38	4 51	1 23	5 51
4	F		7 37	4 53	2 32	6 26
5	S		7 35	4 54	3 44	6 52
6	S	Septuagesima Sunday. ○ 6 24 A.	7 33	4 56	4 59	7 13
7	M		7 31	4 58	6 14	7 29
8	Tu	Calotype Process pat. 1841	7 30	5 0	7 29	7 44
9	W		7 28	5 2	8 46	7 59
10	Th	Sir David Brewster d. 1868	7 26	5 4	10 5	8 14
11	F		7 24	5 5	11 26	8 30
12	S	[d. 1868	7 22	5 7	Morn	8 49
13	S	Sexagesima Sun. Leon Foucault	7 20	5 9	0 50	9 15
14	M	St. Valentine. (0.35 M.	7 19	5 11	2 13	9 49
15	Tu	Oliver Sarony b. 1820	7 17	5 13	3 30	10 38
16	W	Glasgow Photo. Society found. 1860	7 15	5 15	4 33	11 43
17	Th		7 13	5 16	5 22	After
18	F	Moule's Photogen (artificial light for	7 11	5 18	5 57	2 28
19	S	[portraiture) pat. 1857	7 9	5 20	6 23	3 55
20	S	Quinquagesima (Shrove) Sunday.	7 7	5 22	6 42	5 21
21	M	[Poitevin's p. of Helioplastie pub.	7 5	5 24	6 59	6 42
22	Tu	[1855. ● 7.41 A.	7 3	5 26	7 14	8 0
23	W		7 1	5 27	7 29	9 16
24	Th		6 59	5 29	7 44	10 31
25	F	[1876. Arago b. 1786	6 56	5 31	8 3	11 45
26	S	Senefelder d. 1834. Padre Secchi d.	6 54	5 33	8 25	Morn
27	S	1st Sunday in Lent	6 52	5 34	8 52	0 56
28	M	) 11.13 M.	6 50	5 36	9 29	2 1

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FEBRUARY.

D. M.	D. W.	MEMORANDA.
1	Tu	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
2	W	
3	Th	
4	F	
5	S	
6	S	
7	M	
8	Tu	
9	W	
10	Th	
11	F	
12	S	
13	S	
14	M	
15	Tu	
16	W	
17	Th	
18	F	
19	S	
20	S	
21	M	
22	Tu	
23	W	
24	Th	
25	F	
26	S	
27	S	
28	M	

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MARCH.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. Morn.	MOON. Sets. Morn.
1	Tu		6 48	5 38	10 15	2 58
2	W		6 46	5 40	11 11	3 47
3	Th		6 44	5 41	After	4 24
4	F	Poitevin d. 1882	6 42	5 43	1 26	4 53
5	S	La Place d. 1827. J. Albert b. 1825	6 39	5 45	2 39	5 16
6	S	2nd S. in Lent. Fraunhofer b. 1787	6 37	5 47	3 55	5 35
7	M	J. N. Niepce b. 1765. Herschel b. 1792	6 35	5 48	5 11	5 51
8	Tu	○ 9.29 M.	6 33	5 50	6 28	6 6
9	W	G. W. Wilson d. 1893	6 30	5 52	7 48	6 21
10	Th		6 28	5 54	9 11	6 37
11	F	St. Claire Deville b. 1818	6 26	5 55	10 35	6 55
12	S		6 24	5 57	11 59	7 20
13	S	3rd Sunday in Lent	6 21	6 59	Morn	7 52
14	M	Herschel int. hypo for fixing, 1839	6 19	6 1	1 18	8 37
15	Tu	F. A. Wenderoth d. 1884. (7.48 M.	6 17	6 2	2 26	9 37
16	W		6 15	6 4	3 18	10 50
17	Th		6 12	6 5	3 57	After
18	F		6 10	6 7	4 25	1 36
19	S	Thos. Sutton d. 1875	6 8	6 9	4 47	2 58
20	S	4th Sunday in Lent	6 6	6 11	5 4	4 19
21	M		6 3	6 12	5 20	5 38
22	Tu	● 8.37 M	6 1	6 14	5 35	6 54
23	W		5 59	6 16	5 51	8 9
24	Th	Becquerel b. 1820	5 57	6 18	6 8	9 24
25	F	Hermagis d. 1868	5 54	6 19	6 29	10 36
26	S		5 52	6 21	6 55	11 45
27	S	5th Sun. in Lent. Edgar Pickard	5 49	6 22	7 28	Morn
28	M	La Place b. 1749 [d. 1897	5 47	6 24	8 9	0 46
29	Tu		5 45	6 26	9 1	1 39
30	W	) 7.40 M.	5 43	6 28	10 2	2 20
31	Th		5 40	6 30	11 8	2 52

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MARCH.

D. M.	D. W.	MEMORANDA.
1	Tu	
2	W	*For* MEETINGS OF SOCIETIES, *see pp.* 574-623.
3	Th	
4	F	
5	S	
6	S	
7	M	
8	Tu	
9	W	
10	Th	
11	F	
12	S	
13	S	
14	M	
15	Tu	
16	W	
17	Th	
18	F	
19	S	
20	S	
21	M	
22	Tu	
23	W	
24	Th	
25	F	
26	S	
27	S	
28	M	
29	Tu	
30	W	
31	Th	

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APRIL.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. After.	MOON. Sets. Morn.
1	F	[cault, 1845. Morse d. 1872	5 38	6 31	0 19	3 18
2	S	First Sun Photo. by Fizeau and Fou-	5 36	6 33	1 33	3 39
3	S	Palm Sunday	5 34	6 34	2 49	3 55
4	M	[b. 1795	5 31	6 36	4 6	4 10
5	Tu	Rev. J. B. Reade b. 1801. Isid. Niepce	5 29	6 37	5 25	4 25
6	W	○ 9.20 A. [Victor d. 1870	5 27	6 39	6 47	4 41
7	Th	Voigtländer d. 1878. Niepce de St.	5 25	6 41	8 12	5 0
8	F	Good Friday [1839	5 23	6 43	9 38	5 23
9	S	Fox Talbot's First Art. in *Athenæum*,	5 20	6 44	11 3	5 53
10	S	Easter Sun. Pouncy's Carb. Pro.	5 18	6 46	Morn	6 34
11	M	[pat. 1858. Clarence Fry d. 1897	5 16	6 47	0 16	7 30
12	Tu	T. R. Williams d. 1871	5 14	6 49	1 15	8 40
13	W	(2.28 A.	5 11	6 51	1 58	10 0
14	Th		5 9	6 53	2 28	11 24
15	F		5 7	6 54	2 52	After
16	S		5 5	6 56	3 10	2 6
17	S	Low Sunday. Fargier's Carbon	5 3	6 57	3 26	3 22
18	M	[Process pat. 1861	5 1	6 59	3 42	4 38
19	Tu	Warren de la Rue d. 1889	4 58	7 0	3 56	5 53
20	W	J. A. Spencer d. 1878. ● 10.21 A.	4 56	7 2	4 13	7 7
21	Th	Talbot's Photo.-etch. Proc. pat. 1858	4 54	7 4	4 32	8 20
22	F		4 52	7 6	4 56	9 30
23	S		4 50	7 7	5 26	10 35
24	S	2nd Sunday after Easter. Celsius	4 48	7 9	6 5	11 31
25	M	'Sun-blinds' pat. 1862 [d. 1744	4 46	7 10	6 53	Morn
26	Tu	Adam Salomon d. 1881	4 44	7 12	7 50	0 15
27	W	Morse b. 1791	4 42	7 14	8 56	0 50
28	Th	M. Carey Lea d. 1897	4 40	7 16	10 5	1 18
29	F	) 2.5 M.	4 38	7 17	11 16	1 40
30	S	Col. Stuart Wortley d. 1890	4 36	7 19	After	1 58

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APRIL.

D. M.	D. W.	MEMORANDA.
1	F	
2	S	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
3	S	
4	M	
5	Tu	
6	W	
7	Th	
8	F	
9	S	
10	S	
11	M	
12	Tu	
13	W	
14	Th	
15	F	
16	S	
17	S	
18	M	
19	Tu	
20	W	
21	Th	
22	F	
23	S	
24	S	
25	M	
26	Tu	
27	W	
28	Th	
29	F	
30	S	

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MAY.

D. M.	D. W.	Remarkable Events.	Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. After.	Moon. Sets. Morn.
1	S	3rd Sunday after Easter	4 34	7 21	1 42	2 14
2	M		4 33	7 22	2 58	2 29
3	Tu		4 31	7 23	4 18	2 45
4	W	Senebier b. 1742	4 29	7 25	5 42	3 2
5	Th	J. W. Draper b. 1811	4 27	7 27	7 9	3 23
6	F	Humboldt d. 1859. ○ 6.31 M.	4 26	7 29	8 35	3 50
7	S		4 24	7 30	9 57	4 27
8	S	4th S. af. East. Peroxide of H. rec.	4 22	7 32	11 4	5 19
9	M	[for rem. of Hypo,'66. P. Meagher	4 20	7 33	11 54	6 26
10	Tu	S. London Pho. Soc. f. '59 [d. '97	4 19	7 35	Morn	7 45
11	W	Becquerel d. 1891	4 17	7 36	0 30	9 10
12	Th	Sir John Herschel d. 1871. (9.36 A.	4 16	7 38	0 57	10 35
13	F	Justus von Liebig b. 1803	4 14	7 39	1 16	11 56
14	S	Fahrenheit b. 1686	4 13	7 41	1 33	After
15	S	Rogation Sunday [d. 1887	4 11	7 42	1 48	2 28
16	M	C. Breese d. 1875. Major C. Russell	4 10	7 44	2 3	3 42
17	Tu	Association Belge founded, 1874	4 8	7 45	2 19	4 55
18	W		4 7	7 47	2 38	6 7
19	Th	Ascension Day.	4 5	7 48	3 0	7 18
20	F	● 0.58 A.	4 4	7 50	3 28	8 24
21	S	Scheele d. 1786	4 2	7 51	4 3	9 22
22	S	Sunday after Ascension Day	4 1	7 53	4 48	10 11
23	M	B. J. Sayce d. 1895	4 0	7 54	5 42	10 50
24	Tu		3 59	7 55	6 45	11 20
25	W		3 58	7 56	7 52	11 43
26	Th	H. B. Berkeley d. 1890	3 57	7 58	9 2	Morn
27	F		3 55	7 59	10 13	0 2
28	S	) 5.14 A.	3 54	8 0	11 24	0 19
29	S	Whit Sunday. Sir H. Davy d. 1829	3 53	8 1	After	0 34
30	M		3 53	8 3	1 54	0 48
31	Tu		3 52	8 4	3 13	1 4

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MAY.

D. M.	D. W.	MEMORANDA.
1	S	
2	M	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
3	Tu	
4	W	
5	Th	
6	F	
7	S	
8	S	
9	M	
10	Tu	
11	W	
12	Th	
13	F	
14	S	
15	S	
16	M	
17	Tu	
18	W	
19	Th	
20	F	
21	S	
22	S	
23	M	
24	Tu	
25	W	
26	Th	
27	F	
28	S	
29	S	
30	M	
31	Tu	

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JUNE.

D. M.	D. W.	Remarkable Events.	Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. After.	Moon. Sets. Morn.
1	W		3 51	8 5	4 37	1 22
2	Th	Niepce pubsh. his *Heliochromic Pro-*	3 50	8 6	6 3	1 46
3	F	[*cesses*, 1851	3 49	8 7	7 28	2 18
4	S	Tessié du Mothay d. 1880. ○ 2.11 A.	3 48	8 8	8 44	3 2
5	S	Trinity Sunday	3 47	8 9	9 44	4 3
6	M		3 47	8 10	10 27	5 20
7	Tu	Fraunhofer d. 1826	3 46	8 10	10 57	6 47
8	W		3 46	8 11	11 21	8 15
9	Th	Alvan Clark d. 1897	3 45	8 12	11 39	9 40
10	F	[1853. (6.4 M.	3 45	8 13	11 55	11 0
11	S	Cutting's American Bromide pat.	3 45	8 13	Morn	After
12	S	1st Sunday after Trinity	3 45	8 14	0 11	1 33
13	M		3 45	8 15	0 26	2 46
14	Tu	Partnership between Daguerre and	3 45	8 16	0 43	3 58
15	W	[Niepce, 1837	3 44	8 16	1 4	5 9
16	Th	Chrysotype and Cyanotype Process	3 44	8 17	1 30	6 16
17	F	[com. to Royal Society, 1842	3 44	8 17	2 3	7 17
18	S		3 44	8 17	2 45	8 9
19	S	2nd Sunday after Trinity. Abbé	3 44	8 17	3 36	8 50
20	M	[Laborde d. 1883. ● 4.19 M.	3 44	8 18	4 36	9 23
21	Tu	Niepce Memorial uncov. at Chalons,	3 45	8 18	5 42	9 48
22	W	[1885	3 45	8 18	6 51	10 8
23	Th		3 45	8 18	8 2	10 25
24	F	Hardwich d. 1890	3 45	8 19	9 13	10 40
25	S	[bury b. 1834. Liesegang b. 1839	3 46	8 19	10 24	10 55
26	S	3rd S. aft. Trinity. W. B. Wood-	3 46	8 19	11 36	11 10
27	M	Herr Wothly d. 1873. G. Price d.	3 46	8 19	After	11 26
28	Tu	[1870.) 4.54 M.	3 46	8 19	2 12	11 45
29	W	Ferrous-oxalate Developer pub. 1877	3 47	8 19	3 35	Morn
30	Th		3 48	8 18	4 59	0 12

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[*See page* 558.

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JUNE.

D. M.	D. W.	MEMORANDA.
1	W	
2	Th	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
3	F	
4	S	
5	S	
6	M	
7	Tu	
8	W	
9	Th	
10	F	
11	S	
12	S	
13	M	
14	Tu	
15	W	
16	Th	
17	F	
18	S	
19	S	
20	M	
21	Tu	
22	W	
23	Th	
24	F	
25	S	
26	S	
27	M	
28	Tu	
29	W	
30	Th	

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JULY.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises.	MOON. Sets.
1	F		3 49	8 18	6 19	0 49
2	S		3 49	8 18	7 26	1 40
3	S	4th Sun. after Trinity. ○ 9.12 A.	3 50	8 18	8 18	2 49
4	M		3 51	8 17	8 55	4 13
5	Tu	Nicephore Niepce d. 1833	3 52	8 17	9 21	5 44
6	W		3 52	8 16	9 43	7 13
7	Th		3 53	8 16	10 1	8 38
8	F		3 54	8 15	10 16	9 59
9	S		3 55	8 14	10 32	11 18
10	S	5th Sun. after Trinity. Daguerre	3 56	8 13	10 50	After
11	M	[d. 1851. (4.43 A.	3 57	8 13	11 9	1 47
12	Tu	Wedgwood b. 1730. G. Dawson d.	3 58	8 12	11 33	3 0
13	W	Abbé Moigno d. 1884 [1897	3 59	8 11	Morn	4 9
14	Th	Dumas b. 1800	4 0	8 10	0 4	5 12
15	F		4 2	8 9	0 43	6 6
16	S	Claudet b. 1797	4 3	8 8	1 32	6 51
17	S	6th Sunday after Trinity	4 4	8 7	2 29	7 26
18	M	V. M. Griswold (Inv. Ferrotype) d.	4 5	8 6	3 34	7 53
19	Tu	[1872. ● 7.47 A.	4 7	8 5	4 42	8 15
20	W	Collodion Pos. Process pub. 1852	4 8	8 3	5 52	8 33
21	Th	Regnault b. 1810	4 9	8 2	7 3	8 49
22	F		4 10	8 1	8 14	9 3
23	S		4 12	8 0	9 26	9 18
24	S	7th Sun. after Trinity. Captain	4 13	7 58	10 40	9 33
25	M	[Abney b. 1843	4 14	7 57	11 56	9 51
26	Tu	Niepce de St. Victor b. 1806.) 1.40 A.	4 15	7 56	After	10 14
27	W		4 17	7 55	2 36	10 44
28	Th		4 18	7 53	3 55	11 27
29	F	Secchi b. 1818	4 20	7 52	5 8	Morn
30	S	[b. 1800	4 21	7 50	6 6	0 26
31	S	8th Sun. after Trinity. Wohler	4 23	7 48	6 49	1 41

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JULY.

D. M.	D. W.	MEMORANDA.
1	F	
2	S	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
3	S	
4	M	
5	Tu	
6	W	
7	Th	
8	F	
9	S	
10	S	
11	M	
12	Tu	
13	W	
14	Th	
15	F	
16	S	
17	S	
18	M	
19	Tu	
20	W	
21	Th	
22	F	
23	S	
24	S	
25	M	
26	Tu	
27	W	
28	Th	
29	F	
30	S	
31	S	

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AUGUST.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. After	MOON. Sets. Morn.
1	M		4 25	7 47	7 20	3 8
2	Tu	Stromeyer b. 1776. ○ 4.29 M.	4 26	7 45	7 45	4 38
3	W	Mungo Ponton d. 1880	4 28	7 43	8 4	6 7
4	Th		4 29	7 41	8 21	7 32
5	F	Wollaston b. 1766	4 31	7 40	8 37	8 54
6	S		4 32	7 38	8 54	10 13
7	S	9th Sun. after Trinity. Berzelius	4 34	7 36	9 14	11 30
8	M	Roger Fenton d. 1869 [d. 1848	4 35	7 34	9 36	After
9	Tu	(6.13 M.	4 37	7 33	10 4	1 56
10	W	W. H. Harrison d. 1897	4 38	7 31	10 41	3 2
11	Th		4 40	7 29	11 26	4 0
12	F		4 41	7 27	Morn	4 48
13	S	Prof. Stokes b. 1819	4 43	7 25	0 20	5 27
14	S	10th S. aft. Trinity. Daguerreo-	4 44	7 23	1 23	5 57
15	M	[type Process pat. 1839	4 46	7 21	2 31	6 21
16	Tu	Lavoisier b. 1743	4 48	7 19	3 41	6 40
17	W	● 10.34 M.	4 50	7 17	4 52	6 56
18	Th	Dr. Woodward (photo-microscopist)	4 51	7 15	6 4	7 11
19	F	[d. 1884	4 53	7 13	7 16	7 26
20	S		4 54	7 11	8 29	7 42
21	S	11th S. after Trinity. Chevreul	4 56	7 9	9 45	7 59
22	M	[b. 1786	4 57	7 7	11 3	8 20
23	Tu		4 59	7 5	After	8 47
24	W	Cutting (Introd. of Ambrotype) d.	5 0	7 3	1 41	9 24
25	Th	Faraday d. 1867 [1867. ☽ 8.32 A.	5 2	7 1	2 55	10 15
26	F	Paul Pretsch d. 1873. Daguerre Mem.	5 3	6 58	3 56	11 21
27	S	[uncovered, 1883	5 5	6 56	4 43	Morn
28	S	12th Sunday after Trinity	5 7	6 54	5 19	0 41
29	M		5 9	6 52	5 47	2 8
30	Tu	Oliver Sarony d. 1879	5 10	6 50	6 7	3 36
31	W	Helmholtz b. 1821. ○ 0.51 A.	5 11	6 47	6 25	5 2

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AUGUST.

D. M.	D. W.	MEMORANDA.
1	M	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
2	Tu	
3	W	
4	Th	
5	F	
6	S	
7	S	
8	M	
9	Tu	
10	W	
11	Th	
12	F	
13	S	
14	S	
15	M	
16	Tu	
17	W	
18	Th	
19	F	
20	S	
21	S	
22	M	
23	Tu	
24	W	
25	Th	
26	F	
27	S	
28	S	
29	M	
30	Tu	
31	W	

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SEPTEMBER.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. After.	MOON. Sets. Morn.
1	Th	Norris's Dry-plate Process pat. 1856	5 13	6 45	6 41	6 26
2	F		5 15	6 43	6 58	7 47
3	S	[bury d. 1885	5 17	6 41	7 17	9 6
4	S	13th Sun. after Trinity. Wood-	5 18	6 39	7 39	10 23
5	M	Pantascopic Camera pat. 1862	5 20	6 37	8 6	11 37
6	Tu	[1885. ☾ 10.51 A.	5 21	6 34	8 39	After
7	W	Poitevin Memorial inaugurated,	5 23	6 32	9 21	1 50
8	Th	Gel.-bro. Pro. pub. by Maddox, 1871	5 24	6 30	10 12	2 42
9	F	Col.-bro. Pro. pub. 1864	5 26	6 28	11 13	3 24
10	S		5 27	6 25	Morn	3 57
11	S	14th Sunday after Trinity	5 29	6 23	0 18	4 23
12	M		5 31	6 20	1 27	4 44
13	Tu		5 33	6 18	2 38	5 2
14	W	Humboldt b. 1769	5 34	6 16	3 50	5 18
15	Th	Petzval d. 1891	5 36	6 14	5 2	5 33
16	F	● 0.10 M	5 37	6 11	6 15	5 49
17	S	Fox Talbot d. 1877	5 39	6 9	7 31	6 6
18	S	15th S. after Trinity. Leon Fou-	5 40	6 7	8 50	6 26
19	M	T. Grubb d. 1878 [cault b. 1819	5 42	6 5	10 10	6 52
20	Tu	Talbot's Discovery of Develop. 1840	5 43	6 2	11 30	7 26
21	W	Stas b. 1813	5 45	6 0	After	8 12
22	Th	Faraday b. 1791. Thos. Sutton b. '19	5 47	5 57	1 49	9 13
23	F	Woodbury Pro. pat. 1864. ☽ 2.39 M.	5 49	5 55	2 40	10 26
24	S	J. G. Tunny d. 1887	5 50	5 53	3 18	11 49
25	S	16th Sun. after Trinity. Dr. Van	5 52	5 51	3 47	Morn
26	M	[Monckhoven b. 1834, d. 1882	5 53	5 48	4 10	1 14
27	Tu	Kolbe b. 1818	5 55	5 46	4 29	2 38
28	W		5 56	5 44	4 47	4 1
29	Th	○ 11.11 A.	5 58	5 42	5 4	5 21
30	F	Balard (Discoverer of Bromine) b. [1802	6 0	5 39	5 22	6 41

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SEPTEMBER.

D. M.	D. W.	MEMORANDA.
1	Th	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
2	F	
3	S	
4	S	
5	M	
6	Tu	
7	W	
8	Th	
9	F	
10	S	
11	S	
12	M	
13	Tu	
14	W	
15	Th	
16	F	
17	S	
18	S	
19	M	
20	Tu	
21	W	
22	Th	
23	F	
24	S	
25	S	
26	M	
27	Tu	
28	W	
29	Th	
30	F	

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OCTOBER.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. After.	MOON. Sets. Morn.
1	S		6 2	5 36	5 42	7 59
2	S	17th Sunday after Trinity. Arago	6 3	5 34	6 7	9 16
3	M	[d. 1853	6 5	5 32	6 38	10 28
4	Tu		6 6	5 30	7 16	11 35
5	W		6 8	5 28	8 4	After
6	Th		6 10	5 25	9 1	1 19
7	F	(6.5 A.	6 12	5 23	10 4	1 56
8	S		6 13	5 21	11 12	2 24
9	S	18th Sunday after Trinity	6 15	5 19	Morn	2 47
10	M		6 16	5 17	0 21	3 6
11	Tu	H. T. Anthony d. 1884	6 18	5 15	1 32	3 23
12	W	Gmelin b. 1792	6 20	5 12	2 43	3 38
13	Th		6 22	5 10	3 56	3 54
14	F		6 23	5 8	5 11	4 11
15	S	● 0.37 A.	6 25	5 6	6 29	4 31
16	S	19th Sun. after Trinity [1887	6 27	5 4	7 50	4 55
17	M	Reaumur d. 1757. Robert Hunt d.	6 29	5 2	9 13	5 27
18	Tu	Schonbein b. 1799. Wheatstone d.	6 30	4 59	10 31	6 11
19	W	[1875	6 32	4 57	11 40	7 8
20	Th		6 34	4 55	After	8 18
21	F		6 36	4 53	1 19	9 38
22	S	) 9.9 M.	6 37	4 51	1 50	11 1
23	S	20th Sunday after Trinity	6 39	4 49	2 14	Morn
24	M		6 41	4 47	2 34	0 24
25	Tu	Vernon Heath d. 1895	6 43	4 45	2 52	1 45
26	W		6 44	4 43	3 9	3 4
27	Th		6 46	4 41	3 26	4 22
28	F	Col.-chlo. of Silver Process pub. 1864	6 48	4 39	3 45	5 39
29	S	Talbot Photo-eng. Process pat. 1852.	6 50	4 37	4 8	6 55
30	S	21st Sun. after Trinity [○ 0.18 A.	6 51	4 35	4 37	8 9
31	M		6 53	4 33	5 12	9 18

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OCTOBER.

D. M.	D. W.	MEMORANDA.
1	S	
2	S	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
3	M	
4	Tu	
5	W	
6	Th	
7	F	
8	S	
9	S	
10	M	
11	Tu	
12	W	
13	Th	
14	F	
15	S	
16	S	
17	M	
18	Tu	
19	W	
20	Th	
21	F	
22	S	
23	S	
24	M	
25	Tu	
26	W	
27	Th	
28	F	
29	S	
30	S	
31	M	

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NOVEMBER.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. After.	MOON. Sets. Morn.
1	Tu		6 55	4 31	5 57	10 20
2	W		6 57	4 30	6 51	11 11
3	Th		6 59	4 28	7 52	11 52
4	F		7 0	4 26	8 58	After
5	S	[b. 1771. (2.28 A.	7 2	4 25	10 6	0 48
6	S	22nd S. after Trinity. Senefelder	7 4	4 23	11 15	1 8
7	M	Dubois Raymond b. 1818	7 6	4 22	Morn	1 26
8	Tu	J. Traill Taylor d. 1895	7 7	4 20	0 24	1 42
9	W	Pretsch's Photo-engr. Pro. pat. 1854.	7 9	4 18	1 35	1 57
10	Th	Laroche d. 1886 [N. Sarony d. 1896	7 11	4 16	2 48	2 13
11	F	Willis's Aniline Process pat. 1864	7 13	4 15	4 4	2 32
12	S	[Turner d. 1896	7 14	4 13	5 24	2 54
13	S	23rd Sunday after Trinity. T. C.	7 16	4 12	6 46	3 24
14	M	● 0.21 M.	7 18	4 10	8 9	4 2
15	Tu		7 20	4 9	9 25	4 56
16	W	Lavater d. 1741	7 21	4 8	10 27	6 4
17	Th		7 23	4 7	11 16	7 24
18	F	Daguerre b. 1787	7 25	4 5	11 52	8 49
19	S		7 27	4 4	After	10 13
20	S	24th Sunday after Trinity. Prof.	7 28	4 3	0 40	11 34
21	M	[Draper d. 1882.) 5.5 A.	7 30	4 2	0 58	Morn
22	Tu	Schlippe b. 1749	7 31	4 1	1 15	0 53
23	W	Harrison (Inv. of Globe Lens) d. 1864	7 33	4 0	1 32	2 10
24	Th		7 34	3 58	1 50	3 26
25	F		7 36	3 57	2 12	4 41
26	S	[1701	7 38	3 56	2 37	5 54
27	S	1st Sunday in Advent. Celsius b.	7 40	3 56	3 10	7 5
28	M	Sutton Panoramic Camera pat. 1859.	7 41	3 55	3 51	8 9
29	Tu	[○ 4.39 M.	7 43	3 54	4 42	9 4
30	W		7 44	3 53	5 41	9 48

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NOVEMBER.

D. M.	D. W.	MEMORANDA.
1	Tu	
2	W	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
3	Th	
4	F	
5	S	
6	S	
7	M	
8	Tu	
9	W	
10	Th	
11	F	
12	S	
13	S	
14	M	
15	Tu	
16	W	
17	Th	
18	F	
19	S	
20	S	
21	M	
22	Tu	
23	W	
24	Th	
25	F	
26	S	
27	S	
28	M	
29	Tu	
30	W	

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DECEMBER.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. After.	MOON. Sets. Morn.
1	Th	Klaproth b. 1743	7 46	3 53	6 46	10 23
2	F		7 47	3 52	7 53	10 51
3	S		7 48	3 52	9 0	11 12
4	S	2nd Sunday in Advent. Galvani	7 49	3 51	10 8	11 30
5	M	[d. 1798. R. Kennett d. 1896	7 51	3 51	11 17	11 47
6	Tu	Obernetter's Chromo-photo. pat.	7 52	3 50	Morn	After
7	W	[1864. (10.6 M.	7 53	3 50	0 27	0 17
8	Th		7 54	3 49	1 40	0 34
9	F	Scheele b. 1742. Duc de Luynes d.	7 56	3 49	2 56	0 53
10	S	[1867	7 57	3 49	4 17	1 18
11	S	3rd S. in Advent. Sir D. Brewster	7 58	3 49	5 38	1 53
12	M	Rev. J. B. Reade d. 1870 [b. 1781	7 59	3 49	6 58	2 39
13	Tu	First Photo-enam. Proc. pat. 1854.	8 0	3 49	8 9	3 40
14	W	E. Anthony d. 1888 [● 11.43 M.	8 1	3 49	9 7	4 58
15	Th		8 2	3 49	9 49	6 24
16	F	H. Greenwood d. 1884. T. Ross d.	8 2	3 49	10 20	7 52
17	S	Sir Humphry Davy b. 1778 [1870	8 3	3 49	10 43	9 19
18	S	4th Sunday in Advent	8 4	3 50	11 3	10 40
19	M	Mawson k. 1867	8 5	3 50	11 21	11 59
20	Tu	) 3.22 M.	8 5	3 50	11 38	Morn
21	W		8 6	3 50	11 56	1 16
22	Th	Wollaston d. 1828	8 6	3 51	After	2 31
23	F		8 7	3 51	0 40	3 45
24	S		8 7	3 52	1 10	4 56
25	S	Christmas Day. Sir I. Newton b.	8 8	3 53	1 48	6 1
26	M	[1642	8 8	3 54	2 36	6 59
27	Tu	○ 11.39 A.	8 8	3 54	3 32	7 47
28	W	J. T. Goddard d. 1866	8 8	3 55	4 35	8 25
29	Th		8 8	3 56	5 41	8 54
30	F	J. H. Dallmeyer d. 1883	8 8	3 57	6 49	9 18
31	S	A. Braun d. 1877	8 9	3 58	7 57	9 37

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DECEMBER.

D. M.	D. W.	MEMORANDA.
1	Th	
2	F	*For* MEETINGS OF SOCIETIES, *see pp.* 574–623.
3	S	
4	S	
5	M	
6	Tu	
7	W	
8	Th	
9	F	
10	S	
11	S	
12	M	
13	Tu	
14	W	
15	Th	
16	F	
17	S	
18	S	
19	M	
20	Tu	
21	W	
22	Th	
23	F	
24	S	
25	S	
26	M	
27	Tu	
28	W	
29	Th	
30	F	
31	S	

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WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

SOLID MEASURE.

20 Grains	= 1 Scruple	= 20 Grains.	
3 Scruples	= 1 Drachm	= 60	,,
8 Drachms	= 1 Ounce	= 480	,,
12 Ounces	= 1 Pound	= 5760	,,

FLUID.

60 Minims	= 1 Fluid Drachm.
8 Drachms	= 1 Ounce.
20 Ounces	= 1 Pint.
8 Pints	= 1 Gallon.

The above weights are those usually adopted in formulæ.

All Chemicals are usually sold by Avoirdupois Weight, in which there are 437½ grains to the ounce.

The Precious Metals, such as Silver and Gold, are sold by Troy Weight, containing 480 grains to the ounce.

FRENCH WEIGHTS AND MEASURES,

AND THEIR EQUIVALENTS IN ENGLISH.

1	Cubic Centimètre	= 17 minims nearly.
3½	,, ,,	= 1 drachm.
28·4	,, ,,	= 1 ounce.
50	,, ,,	= 1 ounce, 6 drachms, 5 minims.
100	,, ,,	= 3 ounces, 4 drachms, 9 minims.
1000	,, ,, or 1 litre, = to 61 cubic inches	= 35 ounces, 1 drachm, 36 minims.

The unit of French liquid measures is a cubic *centimètre*.

A cubic *centimètre* of water measures nearly 17 minims (16·896); it weighs 15·4 grains, or 1 *gramme*. A cubic *inch* of water weighs 252·5 grains.

The unit of French weights is the gramme = 15·4 grains; thus a drachm (60 grains) is nearly 4 grammes (3·88). An easy way to convert grammes into English weight is to divide the sum by 4, which gives the equivalent in drachms very nearly thus:—

Grammes.	Drachms.	Oz. Drachm.	Grains.
100 ÷ 4	= 25	= 3 . 1	+ 43

THE METRICAL SYSTEM.

By George Fernau.

In the appended comparative tables of British and metrical weights and measures, the following metrical units and their equivalents have been adopted as the basis of calculation, viz.:—

The Metre.

The metre, as a unit of *length*, represents the ten-millionth part of a meridian, drawn from the Pole to the Equator. A centimetre, as the name implies, is the hundredth part of a metre; and a kilometre is equal to one thousand metres.

1 Metre = 39·371 inches.
1 Yard = 0·914 metre.
1 Mile = 1·609 kilometres.

The Litre.

The litre, as the unit of *capacity*, represents the cube of a tenth part of a metre, a cubic centimetre (c. c.) thus being the thousandth part of a litre.

1 Litre = 1·761 pints.
1 Gallon = 1·543 litres.

The Gramme.

The gramme, as the unit of *weight*, corresponds to the thousandth part of the weight of a litre of distilled water at its greatest density. One thousand grammes represent one kilogramme.

1 Gramme = 15·432 grains.
1 Grain = 0·065 grammes.
1 Pound (avoirdupois) = 0·454 kilogrammes.
1 Hundredweight = 50·800 ,,

General Remarks.

Centimetres, metres, and kilometres, grammes and kilogrammes, and litres and millimetres (millimetres are usually called, for the measure of capacity, cubic centimetres, c. c.), are, as a rule, in the metrical system, and more especially for photographical purposes, the only weights and measures used on the Continent; the kilometres, kilogrammes, and litres for large quantities, and the subdivisions for small quantities. On such usage our tables are made out.

COMPARATIVE TABLES

OF BRITISH AND METRICAL WEIGHTS AND MEASURES FOR THE USE OF PHOTOGRAPHERS.

Troy and Apothecaries'.

BRITISH.		METRICAL.		METRICAL.	BRITISH.		
Weights and Measures.	Solid or Fluid.	Weights and Measures. Wholes and Thousandths.		Weights and Measures.	Solid or Fluid.	Wholes and Thousandths.	
One		Equal to, in:		One	Equal to, in:		
Grain ...	Solid	Grammes	0·065	Gramme ...	Grains	Solid	15·432
Scruple.	,,	,,	1·296	,, ...	Scruples	,,	0·772
Drachm	,,	,,	3·888	,, ...	Drachms	,,	0·257
,,	Fluid	c. c.	3·544	C. c.	,,	Fluid	0·282
Minim ..	,,	,,	0·059	,, ...	Minims	,,	16·920
Ounce ...	Solid	Grammes	31·104	Gramme ...	Ounces	Solid	0·032
,,	Fluid	c. c.	28·350	C. c.	,,	Fluid	0·035
Pound...	Solid	Kilogrammes	0·373	Kilogramme	Pounds	Solid	0·681
Pint ...	Fluid	Litres	0·568	Litre	Pints	Fluid	1·760
Quart ...	,,	,,	1·136	,, ...	Quarts	,,	0·880
Gallon...	,,	,,	4·543	,, ...	Gallons	,,	0·220
Avoirdupois or Imperial.							
Drachm	Solid	Grammes	1·772	Gramme ..	Drachms	Solid	0·564
Ounce ...	,,	,,	28·350	,, ...	Ounces	,,	0·035
,,	Fluid	c. c.	28·350	C. c.	,,	Fluid	0·035
Pound...	Solid	Kilogrammes	0·454	Kilogramme	Pounds	Solid	2·205
Pint ...	Fluid	Litres	0·568	Litre	Pints	Fluid	1·760
Quart ...	,,	,,	1·136	,, ...	Quarts	,,	0·880
Gallon...	,,	,,	4·543	,, ...	Gallons	,,	0·220
Inch ...	Linear	Metres	0·025	Metre	Inches	Linear	39·370
Foot ...	,,	,,	0·305	,, ...	Feet	,,	3·278
Yard ...	,,	,,	0·914	,, ...	Yards	,,	1·094
Mile ...	,,	Kilometres	1·609	Kilometre ..	Miles	,,	0·622

HOW TO USE THE TABLES.

The last column in both tables represents the multiplying term for any unit in either system of weights and measures. Thus, 1 drachm, fluid (troy), being 3·544 cubic centimetres (c. c.), 6 drachms will be 6 × 3·544, or 21·264 c. c., or 21¼ c. c. more or less. In the same way, 1 drachm, solid (avoirdupois), being 1·772 grammes, 6 drachms will be 6 × 1·772, or 10·632, or 10⅝ grammes more or less. As examples in the other table, 1 gramme being 15·432 grains, 10 grammes will be 154·32 grains; or 1 gramme being 0·035 ounce, solid (avoirdupois), 100 grammes will be 3·50 ounces, or 3½.

VALUE OF BRITISH WEIGHTS AND MEASURES.

Troy and Apothecaries'.

1 Drachm, solid	= 3 scruples	= 60 grains.	
1 ,, fluid	= 60 minims	= 54½ ,,	
1 Ounce, solid	= 8 drachms	= 480 ,,	
1 ,, fluid	= 8 ,, fluid	= 437½ ,,	
1 Pound, solid	= 12 ounces	= 96 drachms	= 5760 grains.
1 Pint, fluid	= 20 ,, fluid	= 160 drachms, fluid	= 8750 ,,

Avoirdupois or Imperial.

1 Drachm	= 27·344 grains.		
1 Pound	= 16 ounces	= 256 drachms	= 7000 grains.
1 Pint	= 20 ,, fluid	= 8750 grains.	
1 Yard	= 3 feet	= 36 inches.	
1 Mile	= 1760 yards.		

Grains, whether troy, apothecary, or avoirdupois, are all equal in weight.

RULES OF THE PHOTOGRAPHIC CLUB.

[We frequently receive requests, from those engaged in the formation of new Photographic Societies, for information concerning the Rules that are necessary. The Rules of the Photographic Club, here appended, will be found an admirable basis to work on.]

I.—The Photographic Club is formed for the purpose of enabling its Members to discuss technical details connected with photography in a social manner.

II.—The Officers of the Club, hereinafter called the Committee, shall consist of two Trustees, Treasurer, Secretary, Recorder, Curator, Librarian, and eight other Members of Committee, five of whom shall form a quorum. The offices of Treasurer and Secretary may be merged into one at the discretion of the Committee.

III.—The Committee shall make such Bye-laws and Regulations (not inconsistent with the Rules) as they may from time to time think necessary.

IV.—The Committee shall have the power to appoint Sub-Committees, for special objects, from the Members of the Club.

V.—A Chairman shall be nominated each evening to preside at the next Meeting of the Club, and, should such proposed Chairman be absent, the Members present shall elect a Chairman on that night.

VI.—The Club shall be opened at 7: one hour, 8 to 9, each evening shall be devoted to the discussion of technical business; the remainder of the evening to social purposes. The Chairman to have the control of the Meeting only during the time devoted to technical business.

VII.—The accounts of the Club shall be audited annually by two Auditors, to be elected from the Members of the Club at the Meeting,

twenty-eight days prior to the Annual General Meeting. No Officer or Member of Committee to be eligible to act as Auditor.

VIII.—The Officers of the Club shall retire annually, but shall be eligible for re-election, if nominated; but no ordinary Member of the Committee shall be eligible for re-election, after serving three consecutive years, until after a lapse of one year. Names of gentlemen proposed as Officers shall be posted on the notice-board fourteen days previous to the Annual General Meeting. Should any Officer resign, or become incapable of acting, the Committee may, at their next Meeting, proceed to fill up the vacancy thereby occasioned.

IX.—There shall be an Annual General Meeting of the Club, held the first Wednesday in November in every year, for the purpose of receiving the Balance-sheet for the past year and the Report of the Committee, the election of Officers (such election to be by ballot, and not by show of hands), and also for any other business in connexion with the Club that may require the decision of a General Meeting. Notice of the Meeting to be sent by post to each Member fourteen days before the date of such Annual General Meeting.

X.—No subject that does not relate to the management of the Club shall be brought forward at the Annual General Meeting; and no alteration in the Rules shall be proposed of which fourteen days' notice shall not have been given.

XI.—A Special General Meeting of the Club shall be called by the Secretary upon the requisition of twelve Members, such requisition to be placed on the notice-board fourteen days before the date of the Special Meeting, the Special Meeting to be held on the usual Meeting night of the Club, after 9 o'clock; but no subject shall be discussed thereat except that stated on the requisition calling the Meeting.

XII.—All Candidates for Membership shall be proposed and seconded by two Members of the Club, the name of each Candidate, his proposer and seconder, to be posted on the board fourteen days before being balloted for; one black ball in five to exclude. The election of a new Member shall be notified to him in writing, with a request for the payment of his subscription. No Member shall be entitled to enjoy the advantages of, or in any way use, the Club until his subscriptions for the current year be paid. Members shall have the power of electing Honorary Members nominated by the Committee, who shall enjoy the privileges of the Club, but not the power of voting on any subject whatever, or holding any office.

XIII.—The Annual Subscriptions for Town Members shall be One Guinea, payable in advance, to the Treasurer, on the first Wednesday in November in each year. Members residing not less than fifteen miles from London (the General Post Office) shall be considered Country Members, and shall pay a subscription of half-a-guinea per annum so long as they continue so to reside; but no Member having a photographic business within that radius shall be considered a Country Member. Members joining the Club before the 31st of January shall pay the full subscription. After the end of January and before the 31st of May, the payment shall be two-thirds; afterthe end of May and before the 30th of September, one-third; the subscription of any Member elected after the 30th of September shall be considered payment for the following year.

XIV.—The payment by a Member of 10*l.* 10*s.* in one sum shall constitute Life Membership; but the number of Life Members shall not exceed five. Candidates for Life Membership shall be accepted in priority of application.

XV.—All subscriptions are due on the first Wednesday in November of each year, and, if not paid within one month, the Secretary shall write to the Member requesting payment, and, if the subscription be not then paid within one month, the Committee shall have power to remove the name from the list of Members.

XVI.—Each Member shall communicate any change of address to the Secretary, and all notices sent to such address shall be considered as duly delivered.

XVII.—The Secretary shall be required to keep proper books of accounts, together with a minute-book. The books of the Club, except the minute-book of the Committee, shall be open to the inspection of the Members on every night of Meeting.

XVIII.—Members shall be at liberty to introduce Visitors to the Meetings of the Club, but the Committee shall have the power to limit the number of such Visitors. An attendance-book shall be kept in which Members and Visitors present at each Meeting shall sign their names.

XIX.—Any Member making himself obnoxious to the Members of the Club shall be reported to the Committee, who shall investigate and, if necessary, call a Special Meeting of the Club to discuss the matter; then, if the majority so decide, the offending Member shall be expelled from the Club, and lose all interest or benefit in it, such decision to be taken by ballot, and not by show of hands.

XX.—A copy of these Rules shall be delivered to every Member, on election, by the Secretary; but no Member shall be absolved from the effects of the Rules on the plea of not having received it.

XXI.—In the event of any one being elected a Member of this Club, and not having paid his subscription in accordance with Rules XIII. and XV., he shall not be eligible for re-election unless he can show just cause to the Committee for such non-payment.

NOTICE OF REMOVAL

On JANUARY 1st, 1898, the Offices of the 'British Journal of Photography,' and the 'British Journal Photographic Almanac' will be REMOVED to

24 Wellington Street, Strand,

LONDON.

THIS STEP, WHICH HAS BEEN IN CONTEMPLATION FOR A CONSIDERABLE TIME, IS RENDERED NECESSARY BY THE REQUIREMENT OF GREATER ACCOMMODATION FOR THE VARIOUS DEPARTMENTS THAN WAS OBTAINABLE AT 2 YORK STREET, COVENT GARDEN, AT WHICH ADDRESS THE 'JOURNAL' AND 'ALMANAC' HAVE BEEN CONTINUOUSLY PUBLISHED ALMOST SINCE THEIR ESTABLISHMENT.

THE NEW PREMISES ARE LARGER AND MORE CONVENIENT THAN THE OLD, AND WILL ENABLE THE PUBLISHERS TO COPE WITH THE GROWTH OF BUSINESS FOR WHICH THE INCREASING CIRCULATION OF THE 'JOURNAL' AND 'ALMANAC' IS RESPONSIBLE, WHILE THE GREATER FACILITIES OBTAINED WILL ADD TO THE CONVENIENCE OF THE PUBLISHING, EDITORIAL, AND OTHER DEPARTMENTS.

FROM THE DATE ABOVE NAMED, ALL COMMUNICATIONS SHOULD BE MADE TO THE NEW ADDRESS—

24 WELLINGTON STREET, STRAND.

LETTERS ON BUSINESS MATTERS SHOULD BE ADDRESSED TO THE PUBLISHERS, HENRY GREENWOOD & CO, AND EDITORIAL LETTERS TO THE EDITORS.

HENRY GREENWOOD & CO.,
24 WELLINGTON ST., STRAND, LONDON.

Advertisement Scale, see page 1396.
Subscription Scale, see page 1221.

Barnet



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BARNET, ENGLAND.

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"ELLIOTT, BARNET."

INDEX.

Description of Barnet Plates	560
Prices of Barnet Plates	561
Opinion on Barnet Plates	562
Barnet Plates for Export	562*a*
Instantaneous Photography	563
Barnet Films	563*a*
Opinions on Barnet P.O.P.	564
Prices of Barnet P.O.P.	565
Photographers' Record	566
Barnet Bromide Paper	567
,, Platino Matt	567
,, Cream Crayon, &c.	567
Enlargements	568
Finishing	568
Snow Enamel Paper	570
Carbon Tissue	571

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EACH BRAND HAS ITS UNIQUE CHARACTERISTICS.

Barnet "Ordinary" Plate.

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$6\frac{1}{2}$,, $4\frac{3}{4}$	2 3	3 8
$7\frac{1}{4}$,, $4\frac{1}{2}$	2 10	4/6
$7\frac{1}{2}$,, 5	3 5	5 3
$8\frac{1}{2}$,, $6\frac{1}{2}$	4/3	6 6
9 ,, 7	5/0	8 0
10 ,, 8	7/3	10/6
13 ,, 8	10 0	15 0
12 ,, 10	10 6	16 0
15 ,, 12	18 0	28 0
18 ,, 16	32 6	50 0
24 ,, 18	51 0	76 6
24 ,, 20	60/0	90 0

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. . . . Barnet, Herts.

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"LAFAYETTE'S"
OPINION
ON



Barnet

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Dear Sirs,—It gives me unqualified pleasure to be able to testify as to the quality of your plates. I have, as you are aware, been using them exclusively in all my studios for the past year. You know in such a business as mine the varied demands which are made on a plate, and I can confidently affirm that for all classes of work, in my opinion, your plates are unequalled.

Yours faithfully,
J. LAFAYETTE,
Of London, Dublin, Glasgow and Manchester.

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ARE SPECIALLY PREPARED
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WITHSTAND DAMP.

For Prices, ee page 561.

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There are few Plates suitable for recording objects in motion, such as birds on the wing, animals running and jumping, owing to the fact that few Plates will stand the necessary forcing to bring out full detail.....

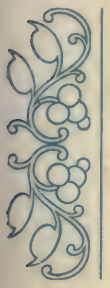
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Are perfect in this respect, and are thickly coated with a special Emulsion of most extraordinary rapidity.....

SEE PAGES 561 & 563A.

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Bicyclists & Travellers,

HAVING THE ADVANTAGE OF BEING



PORTABLE,

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Size.	"ORDINARY" AND "EXTRA RAPID."	"ROCKET."
	Per doz.	Per doz.
$4\frac{1}{4} \times 3\frac{1}{4}$	1/6	2/0
5×4	2/6	3/0
$6\frac{1}{2} \times 4\frac{3}{4}$	3/8	4/6
$8\frac{1}{2} \times 6\frac{1}{2}$	6/6	8/0
10×8	10/0	12/0

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... BARNET ...

P.O.P.

A PROFESSIONAL'S OPINION.

Royal Marine Studio, Bognor,
August 3rd, 1897.

URGENT.

To Messrs. Elliott & Son, Barnet.

DEAR SIRS,

Please send me off immediately per parcels post . . . . of your

BARNET P.O.P.,

Mauve Tint; the last sent I like very much indeed.

I like a good, stout, strong paper, with high surface, that tones readily with 2½ grains of gold per sheet, and your P.O.P. meets all these requirements.

Yours faithfully,
W. P. MARSH.

AN AMATEUR'S OPINION.

London, W.

DEAR SIRS,

I enclose herewith cheque in payment of my a/c. Please send me 3 packets 8½ × 6½ P.O.P. Mauve.

It is decidedly the best P.O.P. of all the gelatino-chloride papers in my opinion. I did not get a double tone in the whole of the last package.

Yours truly,

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PRICE LIST OF CONTINENTAL SIZES UPON APPLICATION.

...BARNET...

P.O.P.

Mauve. White. Pink.

Packets

4	×	3	...	...	...	42 pieces	...	...	...	1/0
4¼	×	3¼	...	...	...	36 ,,	...	...	...	1/0
5	×	4	...	...	...	24 ,,	...	...	...	1/0
6	×	4¼	...	...	...	24 ,,	...	...	...	1/0
6½	×	4¾	...	...	...	16 ,,	...	...	...	1/0
7½	×	5	...	...	...	12 ,,	...	...	...	1/0
8½	×	6½	...	...	...	9 ,,	...	...	...	1/0
10	×	8	...	...	...	12 ,,	...	...	...	2/0
12	×	10	...	...	...	12 ,,	...	...	...	3/0

Tubes.

Containing	2	Sheets	24½	×	17	...	...	1/4
,,	6	,,	24½	×	17	...	...	4/0
,,	12	,,	24½	×	17	...	...	7/6
,,	24	,,	24½	×	17	...	...	15/0
,,	24	,,	24	×	20	...	...	17/6

Gross Boxes.

Per Box containing	144	pieces	3⅝	×	2⅜	...	1/10
,,	,,	,,	3½	×	2¼	...	1/8
,,	,,	,,	5¾	×	4	...	5/0
,,	,,	,,	5½	×	4	...	4/8
,,	,,	,,	8	×	6	...	12/0

Full instructions for working are enclosed.

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DO.	Cream Crayon	
ENLARGING	Rough	

Packet or Tube.

$4\frac{1}{4} \times 3\frac{1}{4}$	24 Sheets	1/0 in Packet.	
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$12\frac{1}{2} \times 10\frac{1}{2}$	,,	4/6 ,,	,,
$15\frac{1}{2} \times 12\frac{1}{2}$	,,	6/9 ,,	,,
18 × 15	,,	9/6 ,,	,,
23 × 17	,,	12/6 ,,	,,
25 × 21	,,	18/0 ,,	,,
Rolls of 10 feet, $24\frac{1}{2}$ inches wide			8/6
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,, 25 ,, 25 ,,			23/0
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JANUARY 1st, 1898.

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5	×	4	...	...	13	,,	...	...	...	1/0
$6\frac{1}{2}$	×	$4\frac{3}{4}$	...	...	12	,,	...	...	...	1/6
$7\frac{1}{2}$	×	5	...	...	12	,,	...	...	...	1/8
$8\frac{1}{2}$	×	$6\frac{1}{2}$	...	...	12	,,	...	...	..	2/6
10	×	8	...	...	12	,,	...	...	...	3/6
12	×	10	..	...	12	,,	...	...	...	5/0
$12\frac{1}{2}$	×	$10\frac{1}{2}$	...	...	12	,,	...	...	...	5/6
$15\frac{1}{2}$	×	$12\frac{1}{2}$	for 6 sheets		3/9	for 12 sheets		...	...	7/6
23	×	17	,,		7/0	,,		...	...	14/0
25	×	21	,,		10/6	,,		...	...	21/0
30	×	25	,,		14/3	,,		...	...	28/6
40	×	30	,,		23/3	,,		...	...	46/6

.... 25 ft. Rolls ....

12 inches wide	...	...	...	...	...	...	11/10
18 ,,	...	...	...	...	...	...	17/4
25 ,,	...	...	...	...	...	...	24/4
30 ,,	...	...	...	...	...	...	29/2

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CARBON TISSUE.—Sensitive or Insensitive.—Colors Photographic Purple, Standard Brown, Engraving Black, Sepia, Red Chalk, Green or Blue.

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Size	5 x 4	6½ x 4¾	7½ x 5½	8½ x 6½	9½ x 7½	10 x 8	11 x 9	12 x 10	15 x 12
Per doz.	1s.	1s. 6d.	2s. 6d.	3s. 6d.	4s. 6d.	6s.	8s. 6d.	9s. 6d.	16s. od.

JOHNSON'S ACTINOGRAPH, 2/6 each.

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Extra Rapid ,,
Rocket ,,
Lantern ,,
Photo-Mechanical ,,
Astronomical ,,
Platino-Matt Bromide Paper
Ordinary Bromide Paper
Snow Enamel Paper
P.O.P.
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	Grains to Grammes.	Ounces to Grammes.	Grains to the Ounce = Grammes to 100 c.c.
1	0·06479	28·3495	0·22817
2	0·12958	56·9660	0·45635
3	0·19437	85·0485	0·68452
4	0·25916	113·3980	0·91269
5	0·32395	141·7475	1·14086
6	0·38874	170·0970	1·36904
7	0·45353	198·4465	1·59721
8	0·51832	226·7960	1·82538
9	0·58311	255·1455	2·05356

CONVERSION OF MINIMS, DRACHMS, OUNCES, AND PINTS TO CUBIC CENTIMETRES AND LITRES.

	Minims to c.c.	Drachms to c.c.	Ounces to c.c.	Pints to Litres.
1	0·05916	3·5495	28·396	0·56792
2	0·11832	7·0990	56·792	1·13584
3	0·17748	10·6485	85·188	1·70376
4	0·23664	14·1980	113·584	2·27168
5	0·29580	17·7475	141·980	2·83960
6	0·35496	21·2970	170·376	3·40752
7	0·41412	24·8465	198·772	3·97544
8	0·47328	28·3960	227·168	4·54336
9	0·53244	31·9455	255·564	5·11128

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PHOTOGRAPHIC SOCIETIES OF THE UNITED KINGDOM.

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Accrington and District Camera Club.—(ESTABLISHED 1892.)—*President*—Dr. Clayton. *Vice-Presidents*—A. Barnes, W. J. Cheney, W. Clayton, T. Stanley. *Committee*—J. Barnes, F. Bradshaw, A. Greenwood, J. A. Hanson, J. R. Hitchon, W. Kenyon. *Secretary and Treasurer*—Isaac Hanson, Rothwell Heights, Accrington.

Affiliation of Photographic Societies.—(ESTABLISHED 1892.)—Meetings held at 12 Hanover Square, London, W. *Chairman*—W. Thomas. *Committee*—Consists of two Delegates from each of the Societies, with three from the Royal Photographic Society. *Treasurer*—George Scamell. *Secretary*—R. Child Bayley, 12 Hanover Square, London, W.

Aintree Photographic Society.—(ESTABLISHED 1894.)—Meetings held at the Aintree Institute, Aintree, Liverpool. *President*—C. H. Adkins. *Vice-Presidents*—W. H. Lloyd and W. Lockier. *Committee*—G. Ashley, J. H. Farmer, C.C., C. F. Inston, D. J. Neill, J. Harris, E. P. Heron, W. B. Hellon, R. M. Owen, C. H. Shafto, R. Bootle, J. Wilson. *Treasurer*—D. J. Kidd. *Secretary*—Raiph Walker, 1 Alexandra Drive, Aintree. *Assistant Secretary*—D. Travis.

Aldenham Institute Camera Club.—(ESTABLISHED 1889.)—Meetings held at the Aldenham Institute, Goldington Crescent, Pancras Road, N.W. *Secretary*—E. Pringle, Aldenham Institute, Goldington Crescent, Pancras Road, N.W.

Altrincham Photographic Society.—(ESTABLISHED 1895.)—Meetings held at the Technical School, Altrincham. *President*—J. Taylor Hughes. *Vice-President*—F. W. Parrott. *Committee*—Messrs. Gibb, Jones, and Wright. *Treasurer*—J. Drinkwater. *Secretary*—C. P. Babin, 19 Clifton Avenue, Altrincham.

Amateur Photographic Field Club.—(ESTABLISHED 1858.)—*President*—H. P. Robinson. *Hon. Secretary*—Francis Cobb, 79 Cornhill, E.C.

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Amateur Photographic Association.—(ESTABLISHED 1869, REORGANIZED 1896.)—Offices: 182 Regent Street, W. *President*—His Royal Highness the Prince of Wales. *Vice-Presidents*—His Royal Highness the Duke of Cambridge, K.G., His Highness the Duke of Teck, G.C.B., &c., His Grace the Archbishop of York, His Grace the Duke of Newcastle, the Right Hon. the Earl of Rosse, F.R.S., the Right Hon. the Earl of Warwick, General the Right Hon. the Lord De Ros, James Glaisher, F.R.S., F.R.A.S., &c. *Council*—The Right Hon. the Viscount Maitland, the Hon. Dudley Leigh, the Hon. Henry Hussey Vivian, Sir J. Whittaker Ellis, Bart., M.P., Charles Stephens, M.A., Oxon., Walter Wood, F.R.G.S., W. S. Hobson, Robert O. Milne. *Hon. Secretary*—Henry Van der Weyde, 182 Regent Street, W.

Arbroath Amateur Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Y.M.C.A. Rooms. *President*—George G. Dalgarno. *Vice-Presidents*—Robert Moodie and Robert Davidson. *Committee*—D. Young, Andrew Scott, D. D. Calder, James Whyte. *Treasurer*—George K. Reid. *Secretary*—James Hood, 94 High Street, Arbroath.

Ashton-under-Lyne Photographic Society.—(ESTABLISHED 1891.)—Meetings held at Henry Square, Ashton-under-Lyne. *President*—Dr. Alexander Hamilton. *Vice-Presidents*—Major Bradley, Abel Buckley, J.P., T. Cheyne, Thomas Glazebrook, J. W. Kenworthy, J.P., C. Lord, C. E. Redfern, J.P., John Wilson, J.P. *Committee*—W. C. Brown, E. H. Hampson, J. Hutchinson, T. F. Kershaw, J. T. Lees, S. Sharp, C. Taylor, S. Woolley. *Librarian*—Samuel A. Platt. *Treasurer*—Walter Leigh. *Secretary*—Robert T. Marsland, 24 Park Parade, Ashton-under-Lyne.

Aston Natural History and Photographic Society.—(ESTABLISHED 1892.)—Meetings held at Burlington Hall, High Street, Aston, on Thursdays, at Eight p.m. *President*—William Tylar. *Vice-President*—Councillor S. Fisher. *Committee*—Messrs. Brooks, Fletcher, Johnson, Lawden, Millward, Rallings, Sands, Taylor, and Wallis. *Treasurer*—J. W. Johnson. *Secretary*—F. W. Pilditch, 185 Bevington Road, Aston.

Banbury and District Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the Municipal Technical Schools, Banbury. *Committee*—W. Potts, T. Blinkhorn, W. Wood, T. E. Orchard, J. A. Knight, J. Brummitt, A. Nicholson, N. G. Ffench. *Secretary and Treasurer*—Seymour H. Beale, Caerleon, Grimsbury, Banbury.

Barnsley and District Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the Arcade Schools, George Yard, Barnsley. *President*—O. de Mirimonde. *Vice-Presidents*—A. R. Tomlin and T. Parkes, M.A. *Committee*—Messrs. Guest, Haigh, Coles, W. Taylor, J. G. Taylor, and Ogden. *Secretary and Treasurer*—Charles Robert Barham, Bond Road, Barnsley.

Barrow Naturalists' Field Club (Photographic Section).—(ESTABLISHED 1890.)—Meetings held at Cambridge Hall, Barrow. *President*—William Dunlop. *Vice-Presidents*—Messrs. Spencer and C. J. Weston. *Committee*—Messrs. Dunlop, Spencer, Weston, Walton, Bailey, Redhead, Timms, and Angus. *Treasurer*—F. W. Walton. *Secretary*—William J. Angus, 79 Greengate Street, Barrow.

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Bath Photographic Society.—(ESTABLISHED 1888.)—Meetings held at the Royal Literary and Scientific Institution. *President*—George F. Powell. *Vice-Presidents*—E. J. Appleby and E. Lambert. *Committee*—Austin J. King, A. F. Perren, Colonel Sealy, the Very Rev. Monsignor Williams, Rev. E. A. Purvis, Dr. Norman, D. Prout Williams. *Secretary and Treasurer*—W. Middleton Ashman, 12A Old Bond Street, Bath.

Batley Photographic Society.—(ESTABLISHED 1893.)—Meetings are held at the Technical School, Batley. *President*—P. Sheard. *Vice-Presidents*—J. J. Jubb and C. Naylor. *Treasurer*—A. Bagshaw. *Secretary*—H. Keighley, West House, Batley.

Belfast Y.M.C.A. Camera Club.—(ESTABLISHED 1889.)—Meetings held at Wellington Place, Belfast. *President*—F. Megarry, J.P. *Vice-Presidents*—William Strain, T. B. Scott, T. F. Bell, A. R. Hogg. *Committee*—E. Bingham, J. A. Pollock, T. Knox, A. George, H. Hill, W. McLean. *Secretary and Treasurer*—J. McCleery, Y.M.C.A., Wellington Place, Belfast. *Assistant Secretary*—H. Rew.

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Blairgowrie and District Photographic Association.—(ESTABLISHED 1894.—Meetings held at 7 Brown Street, Blairgowrie. *President*—Alexander Geekie. *Vice-Presidents*—Miss White and J. B. Maclachlan. *Committee*—W. G. Murray, G. Soutar, J. D. Petrie, D. G. Marnir, Robert Wishton. *Treasurer*—James Richardson. *Secretary*—Thomas C. Gorrie, Beechbank, Rattray, Blairgowrie.

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Birmingham Photographic Society.—(ESTABLISHED 1885.)—Meetings held at the Athletic Institute, John Bright Street, Birmingham. *President*—Sir J. Benjamin Stone, M.P., J.P., F.G.S., F.L.S., F.R.G.S., F.R.A.S. *Vice-Presidents*—G. F. Lyndon, J.P., W. Jones, E. C. Middleton, G. A. Thomason. *Committee*—W. Bateman, C. S. Baynton, P. T. Deakin, W. T. Greatbatch, T. W. Robinson, W. Rooke, T. Taylor, E. Underwood. *Hon. Librarian*—W. S. Horton. *Treasurer*—A. C. Gilbert. *Secretary*—C. J. Fowler, Court Mount, Erdington. *Assistant Hon. Secretary*—F. Lewis.

Bolton Mutual Photographic Society.—Headquarters, County Borough Technical School, Mawdsley Street, Bolton. *President*—Rev. G. H. Carnson. *Vice-Presidents*—James Norris, James Prethean, T. E. Turner. *Committee*—W. Crompton, Joseph Marsden, R. H. Patterson, Alexander Roscoe, John Rigby, Fred Wilkinson, F.G.S., G. Hodges, A. Knight, J. S. Rushton. *Hon. Treasurer*—Percy Farnworth. *Hon. Secretary*—Peter Woods.

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Bolton Society of Professional Photographers.—Meetings first Tuesday in each month, at Hamer's Commercial Hotel. *President*—W. Weatherley. *Hon. Secretary*—N. S. Kay, 55 Knowsley Street, Bolton.

Bootle Photographic Society.—(ESTABLISHED 1894.)—Meetings are held at 188 Strand Road, Bootle. *President*—T. Pinnington. *Vice-Presidents*—E. T. Cockerhan, G. Y. Tickle, J.P., Captain Sibthorpe, W. R. Brewster. *Council*—E. J. McHarg, G. E. Wilkinson, A. B. Charters, R. C. Bond, J. Parke, C. St. C. Crawley, H. S. Frant, H. B. Taylor, H. Wyatt. *Treasurer*—W. T. Wright. *Secretary*—H. G. Page, 188 Strand Road, Bootle.

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Bournemouth Photographic Society.—(ESTABLISHED 1890, REORGANIZED 1895.)—Headquarters, Athenæum Chambers, Town Hall Avenue. *President*—Dr. Hyla Greves. *Vice-Presidents*—J. W. Bennett and A. Youngman. *Committee*—J. Stanley, R. Toop, E. Harrison, C. Riddle, J. H. Woodward. *Hon. Treasurer*—William Jones. *Hon. Secretary*—George F. Scott, 4 Holdenhurst Road, Bournemouth.

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Brixton and Clapham Camera Club.—(ESTABLISHED 1889.)—Meetings are held at Brixton Hall, Acre Lane, London, S.W. *President*—James W. Coade. *Vice-Presidents*—E. Dockree, W. Eraser, A. Horsley Hinton. *Council*—C. F. Archer, J. Gunston, R. G. F. Kidson, J. Price, G. W. Welham, W. H. Whittard. *Secretary*—Frederick W. Levett, 116 Loughborough Park, S.W.

Bromley (Kent) Camera Club.—(ESTABLISHED 1896.)—Meetings held at the School of Science and Art, Bromley (Dark Room at the Library Institute). *President*—S. B. Webber. *Vice-Presidents*—Thomas Davis, J.P., and William Willis. *Committee*—John Scott, B.A., M.B. (Chairman), D. T. Playfair, M.D., M.C., F.L.S., H. C. Bond, M.A., F.C.S., Stanley Hawkings, C.E., R. W. James, M.I.M E., A.M.I.C.E., Albert S. Hicks, F.C.A., Henry J. Tweedy, B.A. *Secretary and Treasurer*—Edgar T. Godward, The School of Science and Art, Bromley, Kent.

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Burton-on-Trent Natural History and Archæological Society (Photographic Section).—(ESTABLISHED 1889.)—Meetings held at 30 High Street, Burton-on-Trent. *President*—Reginald Churchill. *Secretary*—H. H. Port, 103 Scalpcliffe Road, Burton-on-Trent.

Bury Photographic and Arts Club.—(ESTABLISHED 1882.)—Meetings held at 14 Market Street, Bury. *President*—E. W. Mellor, J.P., F.R.G.S., F.I.Inst. *Vice-Presidents*—E. W. Mellor, W. Booth, R. Grundy, jun., R. Wood, T. M. Barbour. *Council*—T. Jones, C. Whittaker, J. W. Handley, J. Hamer, H. M. Dearden. *Hon. Secretary*—A. E. Ridding, 96 Victoria Terrace, Elton, Bury. *Financial Secretary*—C. Stock.

Camera & Company Postal Photographic Circulating Club.—(ESTABLISHED 1891.)—*Hon. Secretary*—Albert O. Forrest, 14 Market Street, Pontypridd.

Campbell College Camera Club.—(ESTABLISHED 1895.)—Meetings held at the Campbell College, Belfast. *President*—G. H. Evans. All communications should be addressed to the President.

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Cheltenham Amateur Photographic Society.—(ESTABLISHED 1865.)—Meetings held at the College Pharmacy, Bath Road, Cheltenham. *President*—General F. Dawson, C.B. *Vice-President*—W. Beetham. *Secretary*—Philip Thomas, College Pharmacy, Bath Road, Cheltenham.

Chester Society of Natural Science and Literature (Photographic Section).—(ESTABLISHED 1887.)—Meetings held at the Grosvenor Museum, Chester. *President*—Henry Stolterforth, M.A., M.D., J.P. *Committee*—P. T. Allen, E. G. Ballard, A.R.S.M., Lieut.-Colonel Dowdall, F. Evans, F. T. Farrimond, F. Longbottom, J. A. McMichael, B.A., B.Sc., C. W. Townshend, T. Wakefield. *Secretary and Treasurer*—James Hampson Spencer, 36 Bridge Street, Chester.

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Chorley Photographic and Sketching Club.—(ESTABLISHED 1894.)—Meetings held at West Street, Chorley. *President*—John Stanton. *Vice-Presidents*—J. T. Brierley, H. R. Dorning, S. Morris, N. Alker. *Committee*—T. Howarth, J. R. Waring, J. Rawlinson, W. Swarbrick, T. Alker, John Blackshaw, J. Fletcher, A. Collier. *Treasurer*—R. Gill. *Secretary*—Thomas Brindle, 52 Market Street, Chorley.

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City of Dublin Y.M.C.A. Camera Club.—(ESTABLISHED 1891.)—Meetings held at 43 Upper Sackville Street, Dublin. *President*—E. MacDowel Cosgrave, M.D. *Vice-Presidents*—Greenwood Pim, M.A., Victor Smyth, J. C. Ruthven, L. R. Strangways, Fred Eason, G. M. Roche. *Council*—G. A. Parnell, A. E. Campbell, Charles E. Stewart, S. C. West, G. W. Riky, J. Gordon, E. Stevenson, J. A. Ray, R. Poynton. *Ladies' Committee*—Miss Owens, Miss Aston, Miss Carnegie. *Hon. Secretary and Treasurer*—R. J. Wilkin, 43 Upper Sackville Street, Dublin.

Clapham Y.M.C.A. Photographic Club.—(ESTABLISHED 1892.)—Meetings are held at the Bedford Hall, High Street, Clapham, S.W. *President*—T. J. Edwards. *Vice-President*—R. D. Gibbs. *Treasurer and Secretary*—G. I. Ninnes, 57 Montholme Road, New Wandsworth, S.W.

Cleckheaton Mechanics' Institute Photographic Society.—(ESTABLISHED 1895.)—Meetings held at the Technical School, Brooke Street. *President*—Dr. Farrow. *Vice-Presidents*—A. Rhodes, H. S. Atkinson, E. W. Taylor. *Committee*—J. Drake, A. Smith, G. Stead, F. Slinger, W. Asquith, E. Ellis, Abe. Smith. *Treasurer*—Frank Hirst. *Secretary*—William Drake, 7 Westgate, Cleckheaton.

Cleveland Camera Club (late Erimus Amateur Photographic Club.)—(ESTABLISHED 1891.)—Meetings held at the Literary and Philosophical Society's Rooms, Corporation Road, Middlesbrough. *President*—S. A. Sadler, J.P. *Vice-Presidents*—Dr. Stainthorpe, Dr. Williams, C. L. Bell, J. J. Burton, G. D. Winter, Angus McPherson. *Joint Secretaries*—Messrs. Pearson and Walker, 98 Victoria Road, Middlesbrough.

Clydesdale Camera Club.—(ESTABLISHED 1889.)—Place of Meeting, Wemyss Bay. *President*—Henry Erskine Gordon. *Secretary and Treasurer*—Hon. A. Caroline Burns, Castle Wemyss, Wemyss Bay, N.B.

Colne Camera Club.—(ESTABLISHED 1893.)—Meetings held at the Cloth Hall, Colne. *President*—Rev. T. Leyland. *Vice-Presidents*—J. Duckworth, Jos. Hey, H. Hewitt. *Treasurer*—Joshua Robinson. *Secretary*—R. T. Lawson, 34 Skipton Road, Colne, Lancashire.

Cornish Camera Club.—(ESTABLISHED 1888.)—Meetings held at 22 Market Place, Penzance (*pro tem.*). *President*—W. E. Bally, F.L.S., C.C. *Vice-President*—B. Vivian, M.R.C.S. *Committee*—J. Branwell, jun., Barnes Richards, R. Pearae Couch, A. R. F. Evershed, M.R.C.S. *Treasurer*—A. R. F. Evershed, M.R.C.S. *Secretary*—H. Tonkin, 22 Market Place, Penzance.

Coventry and Midland Photographic Society.—(ESTABLISHED 1883.)—Meetings held at the Technical Institute. *President*—Alderman Andrews, F.G.S. *Vice-Presidents*—Henry Sturmey, A. Seymour, H. D. Waters, E. J. Walker. *Committee*—W. R. Goate, A. B. Clarke, A. L. Bill, F. E. Peirson. *Secretaries*—F. Leigh Martineau and E. M. Iliffe, 19 Hertford Street, Coventry.

Crewe Amateur Photographic Society.—(ESTABLISHED 1889.)—Meetings held at the Studio, Chester Bridge. *President*—Rev. W. G. Rainsford, D.D. *Vice-President*—E. Booth. *Committee*—J. Lewis, G. Holden, E. Crooke. *Treasurer*—John Cherrey. *Secretary*—Thomas Gorrell, 106 Edleston Road.

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Cromwell Photographic Section of the Great Yarmouth Wheelers.—(REORGANIZED 1897 FROM THE CROMWELL PHOTOGRAPHIC CLUB.)—Meetings are held at the Cromwell Hotel, Great Yarmouth. *President*—H. G. Buxton. *Committee*—Charles Rumbold, George Rumbold, T. Goate, P. Causton, W. J. Denew, H. Palmer. *Secretary*—Frank H. Sayers, St. George's Studio, Great Yarmouth.

Croydon Camera Club.—(ESTABLISHED 1890.)—Meetings held at 106 George Street, Croydon. *President*—Hector Maclean, F.G.S., F.R.P.S. *Vice-Presidents*—The Mayor of Croydon (Councillor Martin Luther Moss), the Right Hon. C. T. Ritchie, M.P., Sir Frederick Edridge, J.P., James Glaisher, F.R.S. *Council*—W. Burn, A. W. Hirst, A. E. Isaac, G. W. Jenkins, A. Jenkins, G. Linton, J. Noaks, J. Packham, F.R.P.S., W. H. Rogers, J. Smith, G. W. Watson, S. H. Wratten. *Treasurer*—H. E. Holland. *Hon. Secretary*—Lionel G. Kough, 122 Birchanger Road, South Norwood, S.E.

Croydon Microscopical and Natural History Club (Photographic Section).—(ESTABLISHED 1870.)—Meetings held at the Public Hall, George Street, Croydon. *President*—J. M. Hobson, M.D., B.Sc., &c. *Vice-Presidents*—John Berney, F.R.M.S., P. Crowley, F.Z.S., F.L.S., H. S. Eaton, M.A., H. T. Mennell, F.L.S., H. G. Thompson, M.D., J.P., &c., Edward Lovett, H. F. Parsons, M.D., F.G.S., W. Murton Holmes. *Committee*—J. H. Baldock, F.C.S. (Lanternist and Recorder), Charles Moss, E. J. Platts, Alfred Roods (Librarian), C. H. Burnaby Sparrow. *Treasurer*—E. B. Sturge. *Secretary*—Harry Douglass Gower, 55 Benson Road, Waddon, Croydon, Surrey.

Cyclists' Photographic Portfolio Club.—(ESTABLISHED 1886.)—Private circulating Club for inspection and criticism of members' prints. *Hon. Secretary*—A. B. Clarke, Hampton House, Coventry.

Darwen Photographic Association.—(ESTABLISHED 1894.)—Meetings held at the Belgrave Schools, Bolton Road entrance. *President*—George Butterworth. *Vice-Presidents*—Rev. Henry Irving and James E. Cooper. *Committee*—R. Ibbotson, J. Cook, R. Holden, A. Almond, J. Cavis, W. Knowles, J. F. Leach, John Cooper. *Treasurer*—Joseph Thomas. *Secretary*—R. H. Duckworth, 445 Bolton Road, Darwen.

Derby Photographic Society.—(ESTABLISHED 1884.)—Meetings held at the Y.M.C.A. Institute on the third Tuesday in the month. *President*—Capt. W. de W. Abney, C.B., D.C.L., F.R.S., F.R.A.S. *Vice-President*—T. A. Scotton. *Committee*—E. W. Bayley, A. H. Bennett, W. R. Bland, C. Bourdin, Dr. William Brass, J. Fleet, A. V. Haslam, C. B. Keene, G. Walker. *Hon. Treasurer*—F. H. Gandy. *Hon. Secretary*—E. Fearn, Richmond Road, Derby.

Devon and Cornwall Camera Club (being the Photographic Section of the Plymouth Institution).—(ESTABLISHED 1887.)—Meetings held at the Athenæum, Plymouth. *Acting Secretary of Section*—R. Hansford Worth, 42 George Street, Plymouth.

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Devonport Camera Club.—(ESTABLISHED 1891.)—Meetings are held at the Oddfellows' Hall, Ker Street, Devonport. *President*—R. E. J. Lamb. *Vice-Presidents*—J. F. Coombes, C. Dart, C. H. Dymond, E. G. Turney. *Committee*—J. Crook, F. E. Turney, C. H. Moore, W. E. A. Drinkwater. *Treasurer*—C. Croydon. *Secretary*—W. H. Lamb, 7 Chapel Street, Devonport.

Doncaster Scientific Society.—(ESTABLISHED 1880.)—*Past Presidents*—The Rev. Canon Brock, M.A., The Rev. W. R. Weston, J. Mitchell Wilson, M.D., F.C.S., The Rev. G. Smith, M.A., John Maw Kirk, F.R.M.S., Walter Roberts, J. Greenhalgh Walker, T. Lovel Atkinson, M.A., LL.B., H. H. Corbett, M.R.C.S., J. B. Prosser, H. Culpin, M. H. Stiles. *President*—G. Bisat. *Vice-Presidents*—W. E. Atkinson, J. Mitchell Wilson, M.D., F.C.S., H. Culpin, M. H. Stiles. *Committee*—T. Cuttriss, R. A. Bellamy, Mrs. Corbett, Mrs. Robinson, T. W. Plant, H. Ord, *Hon. Secretary and Treasurer*—H. H. Corbett, 19 Hallgate, Doncaster.

Dorset Amateur Photographic Association.—(ESTABLISHED 1886.)—Place of Meeting, Dorchester. *President*—Rev. W. Miles Barnes, M.A. *Committee*—Miss E. Williams and R. W. Copeman. *Secretary and Treasurer*—Rev. T. Perkins, M.A., F.R.A.S., Turnworth Rectory, Blandford.

Dukinfield Photographic Society.—(ESTABLISHED 1888.)—Meetings held at the Co-operative Hall, Dukinfield. *President*—T. Hodgetts Gordon, B.A., C.C. *Vice-Presidents*—S. T. Ainsworth, J. W. Hadfield, John T. Lees. *Council*—J. W. Andrew, R. Deakin, W. Jenkinson, P. Rigby, S. Woolley. *Librarian*—H. Broadbent. *Treasurer*—John Winterbottom. *Secretary*—W. H. Shirley, Woodbine Terrace, Dukinfield.

Dulwich Photographic Society—(ESTABLISHED 1895.)—Meetings held at Malmesbury College, East Dulwich Road, S.E., on the second and fourth Tuesdays, at 8.30 p.m. *President*—Sir John Blundell Maple, Bart, M.P., L.C.C. *Vice-President*—J. A. Causton. *Chairman*—H. C. Jackson. *Committee*—E. W. Beer, T. Mitchell, H. Bemister, F. Thomas, F. F. Thomas, — Oakenfall. *Hon. Lanternists*—C. H. Batty and H. Mawbey. *Excursion Secretary*—F. Thomas. *Hon. Treasurer*—C. Dunlop. *Curator and Hon. Secretary*—F. J. W. Pope, 3 Burnaston Terrace, Grove Vale, East Dulwich, S.E.

'Dundee Advertiser' Photographic Club.—(ESTABLISHED 1894.)—Meetings held at Mather's Hotel, Whitehall Street, Dundee. *Hon. President*—Sir John Leng, M.P. *President*—A. C. Mackenzie. *Vice-President*—Alex. F. Gow. *Committee*—John Macrae, Robert Paterson, James L. Scott. *Secretary and Treasurer*—Archibald Campbell, 48 Cleghorn Street, Dundee.

Dundee and East of Scotland Photographic Association.—(ESTABLISHED 1879.)—Meetings held at Lamb's Hotel, Dundee. Club Rooms, 39 High Street, Dundee. *President*—Professor Steggall. *Vice-Presidents*—G. G. Maclaren and W. F. Hill. *Committee*—T. Berry, W. Salmond, A. Stewart, W. H. Tittensor, P. Kilgour, D. Ireland, Dr. Tulloch, A. Wilson, A. Campbell, Baxter Gray, J. A. Mackenzie, T. Maxwell, *Secretary and Treasurer*—V. C. Baird Broughty Ferry, N.B.

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Dunstable Photographic Society.—(ESTABLISHED 1894.)—Meetings held at the Dunstable Institute. *President*—Dr. Hughes. *Vice-Presidents*—Albert Gutteridge and Walter Love. *Treasurer*—A. Perkins. *Secretary*—Edward Hare, The Poplars, Dunstable.

Durham City Camera Club.—(ESTABLISHED 1892.)—Meetings held at the Shakespeare Hall, North Road, Durham. *President*—Captain E. White. *Vice-Presidents*—E. Meynell and J. F. Hobson. *Council*—J. Booth, F. Cluff, T. Harker, J. Morson. *Treasurer*—Councillor W. Gray. *Secretary*—Robert Hauxwell, The Avenue, Durham.

Ealing Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Public Buildings, Ealing. *President*—H. W. Peal. *Vice-Presidents*—C. Jones, W. T. White, T. Simpson. *Committee*—Dr. Clifford Gibbons, W. G. Gregory, A. F. Taylor, B. E. Peal, Roland Whiting, A. Richardson, A. Ernest Smith, H. A. Ball, W. G. Wagner. *Treasurer*—A. F. Taylor. *Secretary*—R. Yoakley Murphy, 7 Argyle Road, Castle Hill, Ealing.

Eastbourne Photographic Society.—(ESTABLISHED 1892.)—Meetings held at the Natural History Society's Room, Lismore Road. *President*—Henry Habgood, M.D. *Vice-Presidents*—H. Michel Whitley and Rev. H. G. Jameson. *Committee*—Messrs. Coster, Ellmore, Kelsey, Plomer, Sparks, Molineux, and Sparrow. *Secretary and Treasurer*—John J. Hollway, 11 Hyde Gardens, Eastbourne.

East Worcestershire Camera Club.—(ESTABLISHED 1894.)—Meetings held at the Institute, Bromsgrove. *President*—C. R. Sayer. *Vice-Presidents*—G. E. Abell, J.P., Jno. Badger, Dr. Ball, E. J. Bigwood, Austen Chamberlain, M.P., W. Corbett, R. Smallwood, J.P., Dr. Wood. *Council*—Miss Brooke, C. G. Crooke, Miss Sayer, F. E. Slater, J. H. Sutton, W. H. Wilson. *Hon. Auditor*—T. Roper. *Hon. Treasurer*—G. W. Widdowson. *Hon. Secretary*—O. Giles, The Crescent, Bromsgrove.

Edinburgh Camera Club.—(ESTABLISHED 1890.)—*President*—P. J. Stirling Boyd. *Committee*—Miss Clouston, William Ford, and the President and Secretary. *Hon. Secretary and Treasurer*—Henry Tod, W.S., 45 Castle Street, Edinburgh.

Edinburgh Photographic Club.—(ESTABLISHED 1881.)—Meetings are held at 38 Castle Street. *President*—Frank P. Moffat. *Committee*—President, Treasurer, and Secretary. *Treasurer*—George Cleland. *Secretary*—Thomas Barclay, 180 Dalkeith Road, Edinburgh.

Edinburgh Photographic Society.—(ESTABLISHED 1861.)—Meetings held at 38 Castle Street, Edinburgh. *Patron*—H.R.H. the Reigning Duke of Saxe-Coburg and Gotha, K.G., K.T., K.P., &c. (Duke of Edinburgh). *Hon. Presidents*—Hippolyte J. Blanc, R.S.A., and John C. Oliphant, M.A. *President*—James Patrick. *Vice-Presidents*—Alexander Eddington and John Stuart Smith. *Council*—Charles J. Souter, P. M. Macintyre, William Linton, J. B. Johnston, Robert Ayton, H. Scott Lauder, James Hay, James Ritchie, F. P. Moffat, Alexander Allan, A. H. Baird, F.R.P.S., John Warrack, jun. *Librarian*—John Anderson. *Treasurer*—George Cleland. *Secretary*—J. S. McCulloch, W.S., 2 George Street, Edinburgh.

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'Evening Times' Camera Club.—(ESTABLISHED 1895.)—Meetings held at 46 Gordon Street, Glasgow. *President*—J. H. A. McIntyre, M.I.M.E. *Vice-Presidents*—T. S. Muir, D. R. Macdonald, A. H. Duncan, J. M. Ewing. *Committee*—K. McLean, W. M. Muirhead, H. C. Shelley, P. R. Wiesner, W. E. Mackie, Thomas Davidson, T. R. Murray, D. W. Macdonald, J. Christie, Robert Burnie, James Gray, G. O. Broadbent, W. L. Primrose, Samuel Smith. *Treasurer*—William M. Gossip. *Secretary*—Robert Sproul, 869 New City Road, Glasgow.

Everton Camera Club.—(ESTABLISHED 1896.)—Meetings are held at Village Street, Everton, Liverpool. *President*—Harry Handley. *Vice-Presidents*—Edwin Allmey and James Hawkins. *Committee*—W. H. Griffiths, E. N. Ellis, T. Sanderson, J. F. Finegan, C. B. Stonehouse. *Secretary and Treasurer*—William Tansley, 14 Wentworth Street, Everton, Liverpool.

Exeter Camera Club (Affiliated to the Exeter Literary Society).—(ESTABLISHED 1890 UNDER STYLE OF EXETER AMATEUR PHOTOGRAPHIC SOCIETY.)—Meetings are held at Barnfield House, Exeter. *President*—Charles Cole. *Vice-Presidents*—W. Brock, J.P., J. W. Huggins, W. Lloyd Jones. *Council*—President, Vice-Presidents, Hon. Treasurer, Hon. Secretary, and H. J. Stanbury, H. C. Bamfylde, R. C. Cole, W. North, E. W. Cox, E. Pocknell (Librarian), F. Green (Lanternist). *Treasurer*—J. Hinton Lake. *Secretary*—Cecil R. M. Clapp, Barfield House, Exeter.

Fakenham District Camera Club.—(ESTABLISHED 1892.)—Meetings held at the Lancaster Temperance Hotel, Fakenham. *President*—Rev. William Martin, B.A. *Vice-Presidents*—Rev. A. E. Humphreys, M.A., and Algernon Digby, M.A. *Committee*—G. H. Davis, H. R. C. Davis, R. W. Dewing, W. O. Miller, J. J. Roberts. *Secretary and Treasurer*—Henry Newson, The Square, Fakenham, Norfolk.

Falkirk Amateur Photographic Association.—(ESTABLISHED 1889.)—Meetings held at Newmarket Street. *President*—George Sherriff. *Vice-President*—T. T. Blackadder. *Committee*—Messrs. Johnstone, Hume, Lyon, J. S. Higgins, Chalmers, and Boyd. *Treasurer and Assistant Secretary*—William C. Murray. *Secretary*—John Higgins, High Street, Falkirk.

Faversham Institute Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Faversham Institute. *President*—Earl Sondes. *Vice-Presidents*—Captain C. F. Hooper, W. C. Stunt, C. T. Evers, M.D. *Committee*—A. N. Filmer, F. C. Jackman, C. Cremer, R. S. Dunn, E. Holladay, M. Laxon. *Secretary and Treasurer*—Charles H. Semark, 8 Albion Terrace, Faversham.

Gainsborough and District Camera Club.—(ESTABLISHED 1894.)—Meetings held at the Coffee Tavern, Gainsborough. *President*—F. J. Cribb. *Vice-Presidents*—E. G. Pepper and C. L. Wilkinson. *Committee*—Messrs. Brocksom, Johnson, Fullalove, Todd. *Secretary*—R. C. Puckering, Clinton House, Gainsborough.

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Glasgow and West of Scotland Amateur Photographic Association.—(ESTABLISHED 1882.)—Meetings held at 180 West Regent Street, Glasgow. *President*—Thomas Steventon. *Vice-President*—A. Cameron Todd. *Council*—Archibald Watson, J. S. Gardner, J. C. Oliver, Dr. Williams, George Chalmers, G. S. Bryson. *Hon. Librarian*—N. G. Reid. *Hon. Lanternist*—Andrew Brown. *Hon. Treasurer*—William J. B. Halley. *Hon. Secretary*—William Goodwin, 3 Lynedoch Street.

Glasgow Photographic Association.—(ESTABLISHED 1862.)—*President*—A. Lindsay Miller. *Vice-Presidents*—William Lang, F.C.S., and J. Craig Annan. *Council*—Robert Dodd, J. E. Hanbidge, George Mason, J. C. Oliver, John Stuart, Archd. Watson. *Treasurer*—George Bell. *Secretary*—Frederick Mackenzie, 122 Wellington Street.

Glenalmond Photographic Club.—(ESTABLISHED 1890.)—*President*—Arthur S. Reid, M.A., F.G.S. *Vice-President*—E. S. Lyttel, B.A. *Committee*—The Officers. *Hon. Librarian*—S. S. Clarke. *Hon Treasurer*—T. N. J. Bell. *Hon. Secretary*—G. O. Cunningham, Glenalmond Photographic Club, Glenalmond, Perthshire.

Glossop Dale Photographic Society.—(RE-ESTABLISHED 1883.)—Meetings held at Norfolk Square, Glossop. *President*—E. Partington, J.P. *Vice-Presidents*—Colonel Sidebottom, M.P., and S. H. Wood. *Committee*—J. Merry, H. Broadhurst, J. T. Whitham, J. T. Hyde, W. Swire. *Treasurer*—J. Hardman. *Secretary*—T. W. Sharpe, 1 Pike's Lane, Glossop.

Gloucestershire Photographic Society.—(RECONSTRUCTED 1887.)—*President*—Richard W. Dugdale. *Vice-President*—Dr. Oscar W. Clarke. *Committee*—H. S. Crump, Dr. W. Hodges, W. Walwin, A. H. Pitcher. *Treasurer*—J. Tibbitts. *Secretary*—Edward A. Ind, 36 Northgate, Gloucester.

Goldsmiths' Institute Camera Club.—(ESTABLISHED 1893.)—Meetings held at the Goldsmiths' Institute, New Cross. *President*—J. W. Penfold. *Vice-Presidents*—J. S Redmayne, Arthur H. Wood, Arthur G. Bloxam, A. L. Spiller, Miss B. Griffiths. *Hon. Treasurer*—J. H. Ridge. *Hon. Secretary*—H. W. J. Browse. *Assistant Hon. Secretary*—C. B. Story, The Goldsmiths' Institute, New Cross.

Goole Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Exchange, Goole. *President*—Robert Blair, J.P., M.D. *Vice-President*—T. C. Turton. *Committee*—Messrs. Turton, Medgley, Buck, Timms, Simpson, and Kettle. *Secretary*—S. Wells, Airmyn, Goole.

Gospel Oak Photographic Society.—(ESTABLISHED 1894.)—Meetings held at the Congregational Schools, Lismore Road, Gospel Oak, N.W. *President*—Rev. H. Le Pla. *Vice-President*—F. H. Hall. *Committee*—W. Beyer, J. Gittens, J. Hingston, J. Pridham, C. Stone. *Treasurer*—J. E. Rayner. *Secretary*—William Alfred Palmer, 13 Dale Road, Kentish Town, N.W. *Assistant Secretary*—H. Billingsley.

Graphic Society.—(ESTABLISHED 1885.)—Meetings held at Plymouth. *President*—S. Kerswell. *Council*—Miss Coath, Messrs. Roy and Foster, Miss Picken, with Officers. *Treasurer*—G. F. Watson. *Secretary*—J. S. Hawker, Mutley House, Plymouth.

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Gravesend Photographic Society.—Meetings held at the Medical Hall Rooms, Milton Road, Gravesend. *President*—J. C. Johnson. *Vice-President*—E. J. Wall. *Council*—Percy J. Boorman, Horatio Sandford, B. L. Rankin, F. H. Wells, Thomas Nettleingham, S. R. Macartney, G. W. Cobham. *Secretary and Treasurer*—T. L. Winnett, 5 The Grove, Gravesend.

Great Yarmouth Amateur Photographic Association.—(ESTABLISHED 1893.)—Meetings are held fortnightly on Monday evenings at the Bridge Hotel, Southtown, Great Yarmouth. *Secretary and Treasurer*—George T. Davis, 4 Market Place, Great Yarmouth.

Great Yarmouth Camera Club.—(ESTABLISHED 1891.)—Meetings are held at the Presidents' and Members' Houses. *President*—Dr. Adcock. *Vice-President*—Rev. E. Rainbow. *Committee*—A. Price, Percy Wiltshire, H. D. Arnott, Rev. D. H. Battersby, E. Swann. *Treasurer*—J. Taylor. *Secretary*—H. Harvey George, The Tower, Gorleston, Great Yarmouth.

Greenock Camera Club.—(ESTABLISHED 1888.)—Meetings are held at the Museum Committee Room, Kelly Street, Greenock. *President*—William Blair. *Vice-President*—James Graham. *Committee*—President, Vice-President, Lanternist, Treasurer, Secretary, and W. D. Boyd, Hugh Watson, T. A. Cunningham, H. Robertson. *Lanternist*—R. W. Jamieson. *Treasurer*—Alexander Bathgate. *Secretary*—George Dunlop, 2 Church Place, Greenock.

Grimsby and District Photographic Society.—(ESTABLISHED 1893.)—Meetings are held at 27A Victoria Street, Grimsby. *President*—Jack Sutcliffe, J.P. (Mayor). *Vice-Presidents*—R. C. Long and Dr. Simpson. *Committee*—W. J. Brumpton, W. H. Marris, E. Shankester, A. E. Mathews, W. C. Butler, — Fountain, — Helsby, A. H. Hewitt, W. Merritt, J. H. Clayton. *Secretary*—A. H. Hewitt, 10 Riby Square, Grimsby.

Guildford Photographic Society.—(ESTABLISHED 1890.)—Meetings held at 36 High Street, Guildford. *President*—The Right Hon. the Earl of Onslow, G.C.M.G. *Vice-Presidents*—Sir J. F. Leese, G. J. Jacobs, J. Russell, A. Horsley Hinton, G. C. Williamson. *Council*—A. W. Bullen, A. J. Moon, T. L. Inman, Rev. G. E. J. Milner. *Treasurer*—J. H. Nunn. *Secretary*—Alfred E. Moon, 36 High Street, Guildford.

Hackney Photographic Society.—(ESTABLISHED 1889.)—Meetings held at the Pembury Hotel, Amhurst Road, Hackney. *President*—Major C. Woolmer-Williams. *Committee*—A. Barker, C. T. Fleetwood, F. W. Gosling, E. Puttock, W. Rawlings, J. J. Westcott, L. S. Wilks. *Treasurer*—Walter L. Barker. *Secretary*—W. F. Fenton-Jones, 12 King Edward Road, Hackney, N.E.

Halifax Camera Club.—(REORGANIZED 1895.)—Meetings held at 29 Northgate, Halifax. *President*—J. Ingham Learoyd. *Vice-Presidents*—T. Illingworth, H. Mortimer, C. Thomas, A. Priestley, J. W. Pilling, G. H. Hodgson. *Council*—Henry Hollas, E. Laughton, T. Palmer, A. Rothera, E. Knapton, George Dyson, A. Oldfield. *Hon. Lanternist*—A. Oldfield. *Treasurer*—Haley Hollas. *Secretary*—J. W. Holland, 17 Glen Terrace Clover Hill, Halifax.

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Haltwhistle and District Photographic Association.—(ESTABLISHED 1889.)—Meetings are held at the Association's Rooms, Haltwhistle, Carlisle. *President*—Dr. W. R. Speirs. *Vice-President*—Major Anne. *Hon. Secretary and Treasurer*—David Macadam, London and Midland Bank, Limited, Haltwhistle.

Hamilton Photographic Association.—(ESTABLISHED 1894.)—Meetings held at the Club Room, Castle Street, Hamilton. *President*—William Barrie. *Vice-President*—John Dick, M.A. *Council*—David N. Cross, James D. Rankin, Peter Tanish, J. C. Pollock, David Miller, David Mimms, Charles Hotson. *Treasurer*—R. A. Wright. *Secretary*—George Brown, Commercial Buildings, Hamilton.

Handsworth Photographic Society.—(ESTABLISHED 1894.)—Meetings held at College House, Hamstead Road, Handsworth, Birmingham. *President*—Philip Whitehouse. *Vice-Presidents*—W. J. Foster, L.R.C.P., E. F. Freeland, C. F. Jarvis, E. J. Timings. *Council*—G. Allen, J. H. Brindley, W. Duff, H. C. Manton, W. J. Morgan, G. Owen, G. Thompson, jun., A. E. Teague. *Treasurer*—C. L. Stait. *Secretary*—G. D. K. Boyle, The Glen, Albion Road, Handsworth, Birmingham.

Hastings and St. Leonards Photographic Society.—(ESTABLISHED 1888.)—*Past Presidents*—Wilson Noble and Rev. A. B. Cotton. *President*—G. G. Gray, J.P., LL.D., F.R.G.S., F.R.H.S., F.L.S., F.S.A., &c. *Vice-Presidents*—Lord Brassey, K.C.B., J. H. Blomfield, Rev. A. B. Cotton, Dr. S. Gilder, Dr. Locke, Rev. A. M. Macdona, J. H. Mayor, Wilson Noble, Dr. A. C. Routh, Lucas Shadwell, M.P., W. Shuter, W. Stubbs, J.P., Councillor F. Tuppenney, Macer Wright. *Council*—J. Barclay, J. H. Godbold, J. F. Mastin, G. Merryweather, J. Smith. *Hon. Treasurer*—W. M. Simpson. *Hon. Secretary*—A. Brooker, 21A Wellington Place, Hastings.

Helios Postal Photographic Club.—(ESTABLISHED 1887.)—A Postal Photographic Club, circulating portfolios amongst the members for the insertion of photographs, which are mutually criticised upon forms supplied for the purpose. *Secretary and Treasurer*—Henry Everett, 125 St. Paul's Road, Bow, London, E.

Holborn Camera Club.—(ESTABLISHED 1889)—Meetings held at 138 Salisbury Court, Fleet Street, E.C. *President*—D. R. Lowe. *Vice-Presidents*—F. Brocas, S. T. Chang, F. Knights. *Committee*—H. Cobb, A. Hodges, E. Hodges, F. J. Cobb. *Librarian and Assistant Secretary*—H. G. Trayfoot. *Treasurer*—Albert Bell. *Secretary*—John Brittain, jun., 52 Hilldrop Road, Camden Road, N.

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Herefordshire Photographic Society.—(ESTABLISHED 1885.)—Meetings held at Clarence House, West Street, Hereford. *President*—Alderman T. Blake, J.P. *Vice-Presidents*—A. Watkins and J. Parker. *Council*—A. C. Edwards, W. Groom, A. C. Slatter, E. G. Davis. *Treasurer*—W. E. Haines. *Secretary*—Cecil Gethen, 9 St. Nicholas Street, Hereford.

Hove Camera Club.—(ESTABLISHED 1892.)—Meetings are held at the Hove Town Hall. *President*—G. B. Woodruff, J.P. *Vice-Presidents*—H. H. Taylor, F.R.C.S., and C. Job. *Committee*—C. B. Stoner, R. Chrimes, W. P. Haycraft. *Treasurer*—J. Williamson. *Secretary*—E. E. Mainwaring, M.R.C.S., &c., 73 Lansdowne Place, Brighton.

Huddersfield Naturalist and Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the Y.M.C.A. Large Lecture Room. *President*—H. G. Brierley. *Vice-President*—T. W. Woodhead. *Committee*—T. H. Bartlam, J. B. Littlewood, F. Netherwood, W. A. Beevers, A. Houghton, Thomas Kendal, A. W. Sykes, T. Jenkinson. *Treasurer*—A. W. Whiteley. *Secretary*—A. Clarke, 9 St. Andrew's Road, Huddersfield.

Hull Photographic Society.—(ESTABLISHED 1884.)—Meetings are held at 71 Prospect Street, Hull. *President*—A. H. White. *Vice-Presidents*—J. Pybus and J. Hollingworth. *Hon. Lanternists*—A. H. Spavin and E. A. Hellier. *Hon. Librarian*—B. H. Brewer. *Treasurer*—W. M. Lyth. *Joint Hon. Secretaries*—J. V. Saunders, 151 Park Avenue, Hull, and R. Ethelbert Johnson, 6 Balmoral Terrace, Anlaby Road, Hull.

Ipswich Scientific Society (Photographic Section).—(ESTABLISHED 1869.)—Meetings are held at the Ipswich Museum. *President*—G. Vincent, M.D., M.R.C.S. *Committee*—J. S. Corder, W. J. Eccott, S. A. Notcutt, E. P. Ridley, W. Vick, F. Woolnough. *Treasurer*—Henry Miller. *Secretary*—Frank Woolnough, Museum, Ipswich.

Isle of Thanet Photographic Society.—(ESTABLISHED 1888.)—Affiliated to the Royal Photographic Society. Meetings held at the Church Club, Broad Street, Ramsgate. *President*—Rev. H. Bartram, M.A. *Vice-Presidents*—Rev. C. E. Eastgate, M.A., G. Dowker, F.G.S., W. Saunders, L.D.S., R.C.S.I., J. H. Forwalk, F.R.H.S. *Committee*—G. F. Blower, E. Deacon, W. F. Roberts, A. D Sackett, A. R. Skellet, A. L. Spratling. *Hon. Lanternist*—J. H. Forwalk. *Hon. Secretary and Treasurer*—J. C. Goldsack, Fletland House, The Elms, Ramsgate.

Keighley and District Photographic Association.—(ESTABLISHED 1889.)—Meetings held at the Mechanics' Institute, North Street, Keighley. *President*—Alexander Keighley, F.R.P.S. *Vice-Presidents*—J. G. Dickinson, Walter Tate, Samuel Bairstow. *Committee*—J. H. Bentley, Thomas Heaps, Ellis Myers, J. Y. Slater, Thomas A. Smith, C. H. Smith, M. Houghton, E. Cockshott. *Treasurer*—Walter Mitchell. *Secretary*—John Gill, 27 Highfield Lane, Keighley. *Assistant Secretary*—W. H. Hainsworth.

Kendal Literary and Scientific Institution (Photographic Section).—(ESTABLISHED 1886.)—Meetings held at the Museum. *Chairman*—Gilbert Gilkes. *Committee*—J. Severs, T. Sharp, J. Sawyers, E. Boundy, C. E. Greenhall, and Chairman, Treasurer, and Secretary. *Treasurer*—T. N. Ritson. *Secretary*—George R. Hargreaves, jun., 17 Greenside, Kendal.

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Kilmarnock and Ayrshire Photographic Society.—(ESTABLISHED 1887.)—Headquarters, Elm Bank, Kilmarnock. *President*—Robert Boyd. *Vice-President*—J. J. Railton. *Treasurer*—John Henderson. *Secretary*—T. Milloy, 41 Boyd Street, Kilmarnock.

King's Lynn Photographic Society.—(ESTABLISHED 1894.)—Meetings held at St. James's Rooms. *Council*—Messrs. Cockle, Daw, Taylor, Tilson, and Winch. *Treasurer*—H. Tilson. *Secretary*—W. E. Daw, Church Street, King's Lynn.

King's Lynn Y.M.C.A. Photographic Club.—(ESTABLISHED 1896.)—Meetings are held at the Y.M.C.A. Rooms, St. James's Street. *Committee*—J. O. Reynolds (Chairman), G. M. Bridges, Mrs. Andrews, S. Smyth, Mrs. Ramsell, B. Johnsen. *Treasurer*—E. H. Andrews. *Hon. Secretaries*—William Lock, 118 Norfolk Street, and F. Hampton, Millfleet Terrace.

Kingston-on-Thames and District Photographic Society.—(ESTABLISHED 1893.)—Meetings are held at the Sun Hotel, Kingston. Club Rooms, 9 Fife Road, Kingston. *President*—Rev. G. J. Swinnerton. *Vice-Presidents*—Rev. F. C. Lambert, W. Montagu Robertson, Dr. Finny. *Committee*—T. Wilson, A. Vandendreische, W. E. Price, A. Hill, Dr. Luscombe, A. E. Smith. *Treasurer*—W. Montagu Robertson. *Secretaries*—John F. East, Uxbridge House, Surbiton, and Paul A. C. Armfelt, Melbourne Lodge, East Molesey.

Lake District Camera Club.—(ESTABLISHED 1894.)—Meetings held at the Lake District Camera Club, Windermere. *President*—J. Bridson, J.P. *Vice-Presidents*—A. Dunlop, J.P., Paul Lange, George Rutter. *Treasurer*—Lieut.-Colonel Reade. *Secretary*—Frederick B. Cattley, Hazelwood, Windermere.

Lancaster Photographic Society.—(ESTABLISHED 1889.)—Meetings held at the Society's Rooms, Stonewell, Lancaster. *President*—Alan Garnett. *Vice-Presidents*—J. W. Pickard and R. W. Wearing. *Committee*—N. Holden, A. S. Barling, J. Crane, J. Parkinson, J. B. Briggs (Librarian). *Treasurer*—W. H. Sutterthwaite. *Secretary*—W. Briggs, 21 Cheapside, Lancaster.

Lantern Slide Exchange Club.—(ESTABLISHED 1889.)—This Club was formed to circulate and exchange lantern slides among its members. *Secretary*—J. S. Hawker, Mutley House, Plymouth.

Leamington Amateur Photographic Society.—(ESTABLISHED 1887.)—Meetings held at the Pump Rooms, Leamington. *President*—Rev. Ed. Healy. *Treasurer*—B. Magrath. *Secretary*—Signor Aspa, Priory House, Leamington.

Leeds Camera Club.—(ESTABLISHED 1893.)—Meetings held at the Grand Restaurant, Boar Lane, Leeds. *President*—R. Bourke. *Vice-Presidents*—Major Norwood, Rev. J. Beanland, M.A., S. Barnes, A. Hornburg, Dr. J. T. Thresh. *Committee*—W. Emmott, F. Rust, P. Elliff, H. Morfitt, C. C. Vevers, G. Dixon, W. Fox. *Treasurer*—T. R. Thompson. *Secretaries*—W. R. Irwin, 3 Harold Terrace, Hyde Park, Leeds, and N. Stockwell, 60 Woodsley Road, Leeds.

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Leeds Photographic Society.—(ESTABLISHED 1852.)—Meetings held at the Leeds Institute of Science, Art, and Literature. *President*—Peter Gilston, J.P. *Vice-Presidents*—Herbert Denison, F.R.P.S., and B. A. Burrell, F.I.C. *Committee*—A. W. Atkinson, H. P. Atkinson, Rev. J. Beanland, M.A., Godfrey Bingley, F. Butterworth, G. H. Rodwell, James Taylor, S. A. Warburton, together with the Officers. *Hon. Secretary and Treasurer*—Alfred Naylor, 2 Providence Terrace, Leeds.

Leicester and Leicestershire Photographic Society.—(ESTABLISHED 1885.)—Meetings held at the Old Town Hall. *President*—T. W. Gamble. *Vice-President*—W. J. Coates. *Committee*—G. Bankart, W. Howard, E. B. Miles, W. Murry, J. Porritt, S. Squire. *Treasurer*—J. Toone. *Secretary*—T. Brown, 68 Church Gate, Leicester.

Leigh Photographic Society.—(ESTABLISHED 1892.)—Meetings are held in the Old Grammar School, Market Place, Leigh. *President*—M. F. Burrows, J.P. *Vice-Presidents*—Dr. Jos. Jones, Robert Lee, T. Lee Syms, J. Ward, B.A., J. H. Stephens, R. B. Mawson, W. Hampson, T. Peters. *Committee*—J. Berry, T. G. Hirst, W. Crouchley, T. Mercer, P. Seddon. *Treasurer*—Thomas Haddock. *Secretary*—William Rose Moore, 92 Bradshawgate, Leigh.

Leith Amateur Photographic Association.—(ESTABLISHED 1888.)—Meetings held at the Liberal Club. *President*—Robert Hunter. *Vice-President*—Thomas Wilson. *Council*—W. M. Smith, A. D. Guthrie, W. Seater. *Treasurer*—M. Campbell. *Secretary*—Alexander Pitkethly, 8 Wilkie Place, Leith.

Lewes Photographic Society.—(ESTABLISHED 1888.)—Meetings are held at the Town Hall, Lewes. *President*—G. J. Whitman. *Vice-President*—J. Tunks. *Committee*—E. T. Hall, W. E. Nicholson, E. L. Tippin, W. J. Young, C. A. Wells. *Secretary and Treasurer*—George Carpenter, 81 High Street, Lewes.

Lewisham Camera Club.—(ESTABLISHED 1890.)—Meetings held at the Rooms of the Congregational Church, Lewisham High Road, New Cross, London, S.E. *President*—B. Davidson. *Vice-Presidents*—Mr. Justice Darling, W. J. Dibdin, F.I.C., F.C.S., A. Haddon, Prof. C. J. Lambert, M.A., F.R.A.S., H. Bedford Lemere, A. H. Miles, M. Stodart. *Committee*—H. Allen, F. R. Ball, C. Churchill, A. Roberts, A. J. Dickinson, F.I.C., F.C.S., H. C. Summers. *Hon. Lanternist*—H. L. Davis. *Financial Secretary and Treasurer*—E. Eastwood. *Secretary*—R. Greenwood, 143 Jerningham Road, New Cross, London, S.E.

Leytonstone Camera Club.—(ESTABLISHED 1891.)—Meetings are held at 414 High Road, Leytonstone. *President*—Dr. W. Pickett Turner. *Vice-Presidents*—A. Horsley Hinton, Mr. Justice Byrne, W. B. Whittingham, J.P., D. J. Morgan. *Council*—C. Amor, W. J. Ball, G. E. Cox, G. H. Cricks, G. U. Haslam, M. D. Kerr, F. W. Wates, A. P. Wire, A. Woodcock. *Treasurer*—C. Andrews. *Secretary*—Albert E. Bailey, Rose Bank, South-West Road, Leytonstone. *Assistant Secretary and Lanternist*—C. A. Russell.

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Lichfield Amateur Photographic Society.—(ESTABLISHED 1896.)—Meetings held at the Coffee House, Market Square. *President*—J. H. Hodson. *Vice-President*—A. W. Barnes. *Committee*—A. S. Wearing, J. Key, V. Grundy, H. E. Craven, J. Pinchers, A. E. Marshall. *Secretary and Treasurer*—E. J. Smith, 47 Trent Valley Road, Lichfield.

Light and Truth Postal Photographic Club.—(ESTABLISHED 1890.)—The objects of this Club are the mutual instruction and recreation of its members, by the circulation through the post of photographs produced by them, for criticism, exchange, &c., and also the discussion of photographic subjects. *Hon. Secretary*—T. B. Judson, 68 Broad Street, Worcester.

Lincoln Camera Club.—(ESTABLISHED 1892.)—Meetings held at the Lincoln Coffee Palace. *President*—G. Lowe, M.D. *Vice-Presidents*—Rev. Canon Fowler, Rev. A. F. Wilson, Dr. P. Sharp. *Committee*—J. A. Graves, R. C. Minton, G. Tuckwood, jun., C. W. Witted, G. Grierson, F.L.S., G. Keyworth. *Treasurer*—C. Nelson. *Secretary*—W. E. Asquith, 24 Altham Terrace, Lincoln.

Liverpool Amateur Photographic Association.—(ESTABLISHED 1863.)—Meetings held at Percy Buildings, Eberle Street, Liverpool. *President*—Dr. J. W. Ellis, F.E.S. *Vice-Presidents*—W. Prior Christian and E. Rimbault Dibdin. *Council*—A. Tyrer, Paul Lange, F. Anyon, Rev. W. Smith, John H. Welch, G. B. Newton, Jos. Earp, Dr. Llewyllen Morgan, E. L. Marriott, J. Sirett Brown, T. F. Lloyd, Henry Lupton, G. A. Carruther. *Treasurer*—P. H. Phillips. *Secretary*—Frederick A. Schierwater, Percy Buildings, Eberle Street, Liverpool.

Liverpool Central Y.M.C.A. (Photographic Section)—(ESTABLISHED 1889.)—Meetings are held at the Y.M.C.A., Mount Pleasant. *Corresponding Secretary*—Herbert Hannah, 31 Vandyke Street, Lodge Lane, Liverpool.

Liverpool Physical Society (Photographic Section).—(ESTABLISHED 1891.)—Meetings are held at University College, Liverpool. *President*—Dr. J. L. Howard. *Treasurer*—C. A. Depeuse. *Secretary*—Dr. Charles A. Kohn, University College, Liverpool.

Llandudno Camera Club and Lantern Society.—(ESTABLISHED 1892.)—Meetings held at the Club Rooms, Bodhyfryd Road, Llandudno. *President*—Right Hon. Lord Mostyn. *Vice-Presidents*—Dr. Dalton, Elias Jones, A. H. Hughes *Committee*—Messrs. Campbell, Watterson, Dean, Sutton, and King. *Treasurer*—William Williams. *Secretary*—A. Ernest Deacon, Bodhyfryd Road, Llandudno.

London and Provincial Photographic Association.—(ESTABLISHED 1882.)—Meetings held at the White Swan, Tudor Street, Whitefriars, E.C., every Thursday evening. *Trustees*—A. Haddon and J. B. B. Wellington. *Committee*—Messrs. Bayston, R. Beckett, R. P. Drage, J. E. Hodd, A. Mackie, E. J. Wall, H. Snowden Ward, W. D. Welford. *Curator*—F. B. Grundy. *Recorder*—A. W. W. Bartlett. *Librarian*—H. C. Rapson. *Secretary and Treasurer*—T. E. Freshwater, F.R.M.S., 45 Torriano Avenue, N.W.

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Longton and District Photographic Society.—(ESTABLISHED 1894.)—Meetings held at the Endowed School, Trentham Road, Longton. *President*—Dr. A. Parkes, M.R.C.S., L.R.C.P., &c. *Vice-Presidents*—E. Hallam and W. W. Hulse. *Committee*—T. P. Hulse, R. Prince, S. Jackson, E. H. Todd, F. T. Holford, J. Bold, W. Bates. *Treasurer*—S. Ashcroft. *Secretary*—Thomas Mottershead, 43 Stafford Street, Longton, Staffordshire.

Loughborough Photographic Society.—(ESTABLISHED 1888.)—Meetings held at the Photographic Rooms, Church Gate. *President*—W. C. Burder. *Committee*—Messrs. Burder, Bartlett, Brotherton, Colgrove, Clarke, Hepworth, Kelsey, Watson, and Yeomans. *Secretary*—H. Kelsey.

Louth and District Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Town Hall and at 8 Upgate, Louth, Lincolnshire. *President*—Rev. J. E. Standen. *Treasurer*—H. S. Forman. *Secretaries*—S. Francis Clarke, L.D.S., 8 Upgate, Louth, and Herbert C. Bentley, Apsley Villa, Grimsby Road, Louth, Lincolnshire.

Lyonsdown Amateur Photographic Society.—(ESTABLISHED 1886.)—Meetings held at members' houses. *President*—Frank Crosbie. *Treasurer*—Harold Imray. *Secretary*—Walter Crosbie, The Chestnuts, Lyonsdown, New Barnet.

Manchester Amateur Photographic Society.—(ESTABLISHED 1885.)—Meetings held at the Manchester Athenæum. *President*—J. W. Wade. *Vice-Presidents*—T. Morley Brook, James Davenport, G. E. Mellor, H. Smith. *General Committee*—H. Brownbill, F. W. Burton, S. L. Coulthurst, Rev. H. W. Dick, A. W. Duncan, T. Glazebrook, J. W. Hadfield, W. A. Hepburn, James Shaw, J. F. Tristram, M.A., B.Sc., George Wheeler, J. W. Young. *Sub-Committees*—Record: T. Morley Brook, S. L. Coulthurst, Rev. H. W. Dick, G. E. Mellor, J. F. Tristram, M.A., B.Sc. (Hon. Secretary): Society's Rooms: H. Brownbill, F. W. Burton, S. L. Coulthurst, J. W. Young, James Shaw (Hon. Secretary): Demonstrations: T. Morley Brook, Rev. H. W. Dick, T. Glazebrook, W. A. Hepburn, S. L. Coulthurst (Hon. Secretary); Survey: T. Morley Brook, C. Dawson, H. Smith, J. W. Young, S. L. Coulthurst (Hon. Secretary); Lantern: F. W. Burton, W. A. Hepburn, James Shaw, J. F. Tristram, M.A., B.Sc., C. Dawson (Hon. Secretary). The President and Secretary are *ex officio* members of all Sub-Committees. *Librarian*—J. W. Young. *Editor of Magazine*—G. E. Mellor. *Hon. Treasurer*—Charles Dawson. *Secretary*—F. W. Parrott, Ashfield Road, Altrincham.

Manchester Photographic Society.—(ESTABLISHED 1855.)—Meetings held at the Chamber of Commerce Rooms, 44 Mosley Street, Manchester. *President*—Jas. Wood. *Vice-Presidents*—A. E. Casson, T. Chilton, F. Edwards, W. Tomlinson, J. C. Wolfenden. *Council*—W. Blakely, J. G. Chapman, J. Evans, G. Grundy, W. Hughes, S. Knowles, J. Peddie, H. Wade, Jas. Wild, W. B. Wood. *Hon. Librarian*—F. Edwards. *Hon. Curator*—W. Tomlinson. *Hon. Reporter*—J. G. Chapman. *Hon. Treasurer*—W. G. Coote. *Hon. Secretary*—C. H. Coote, 10 Holmefield, Sale, near Manchester.

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Manchester Camera Club.—(ESTABLISHED 1885.)—*Committee*—W. A. Hepburn, J. T. Foster, F. T. Overmann, J. V. Wade. *Treasurer*—James Davenport. *Secretary*—Charles Dawson, 66 Peter Street, Manchester.

Manchester Y.M.C.A. Photographic Club.—(ESTABLISHED 1890.)—Meetings held at the Y.M.C.A., 56 Peter Street, Manchester. *President*—G. T. White. *Vice-Presidents*—A. C. Harrison and W. H. Newett. *Committee*—Irving Hume, A. W. Pearson, W. H. Cheetham, W. H. Machin. Arnold Little. *Treasurer*—George Dixon. *Secretary*—J. W. Price, 56 Peter Street, Manchester.

Midland Camera Club.—(ESTABLISHED 1891.)—Meetings held at the Medical Institute, Edmund Street, Birmingham. *President*—H. R. Leech, M.R.C.S., J.P. *Vice-Presidents*—Hall-Edwards, L.R.C.P., Councillor Lancaster, C. Jevons Fowler. *Council*—T. H. Cox, J. Donaghue, William Dudley, M.R.C.S., T. J. Perry, T. Smallwood. *Hon. Treasurer*—R. J. Bailey. *Hon. Secretary*—H. Cooper, 19 Bearwood Road, Birmingham.

Midlothian Camera Club.—(ESTABLISHED 1889, REORGANIZED 1893.)—Meetings held at Edinburgh. *President*—D. Bruce Peebles. *Vice-President*—Alexander Calder. *Council*—James Hay, Alexander Dandie, R. C. Ewart. *Treasurer*—W. C. Callender. *Secretary*—A. D. Guthrie, Bonnington, Edinburgh.

Monklands Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the New Library Buildings, Airdrie. *President*—Frank Robertson. *Vice-President*—John W. Eadie. *Committee*—John Skeil, James S. Lewis, W. B. Hossack, R. C. Platt, Robert Dunlop. *Treasurer*—Samuel H. Wood. *Secretary*—William Dixon Gray, 16 Bank Street, Airdrie.

Moseley and District Photographic Society.—(ESTABLISHED 1896.)—Meetings are held at Arnold School, Alcester Road, Moseley. *President*—Captain Davidson. *Vice-Presidents*—Dr. Hall Edwards and Dr. Ratcliffe. *Committee*—Walter Griffiths, S. P. Harris, E. W. Silk, F. Coop. *Treasurer*—W. J. Spurrier. *Secretary*—Charles H. Williams, Devonshire House, Forest Road, Moseley.

Munster Camera Club.—(ESTABLISHED 1891.)—Meetings held at the Crawford Municipal School. *President*—H. S. Noblett. *Vice-Presidents*—R. Atkins, M.A., M.D., J. Day, R. S. Baker, W. R. Atkins, J.P., K. B. Williams. *Committee*—J. Bennett, R. E. Doran, J. J. England, D. Hunter, H. Lund, Miss E. Murphy, E. Murphy, M.D., J. J. Murphy, A. Newsom, G. Percival, Alfred Roche. *Treasurer*—John Day. *Secretary*—J. J. England, Crawford Municipal School of Art, Cork.

Newcastle-upon-Tyne and Northern Counties' Photographic Association.—(ESTABLISHED 1881.)—Meetings held at the Arts Club, Grainger Street, Newcastle-on-Tyne. *President*—W. Parry. *Vice-Presidents*—J. S. B. Bell, Dr. Blacklock, J. Pattison Gibson, J. Watson. *Council*—W. E. Cowen, A. E. Cowling, William Graham, George Hall, J. J. Kirkwood, E. G. Lee, H. G. Ridgway, Captain Sivers, G. L. Snowball, L. Williamson. *Treasurer*—Frederick Park. *Secretary*—William Thompson, 22 Campbell Street, Newcastle-on-Tyne. *Assistant Secretary*—W. Parker Brewis.

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National Association of Professional Photographers of Great Britain and Ireland.—(ESTABLISHED 1891.)—Annual Meetings held in London, Edinburgh, Birmingham, Manchester, Leeds, &c. *President*—W. Barry (Hull). *Vice-Presidents*—J. Crosby (Rotherham), T. Fall (London), C. Lafosse (Ilfracombe), H. J. Whitlock (Birmingham). *Committee*—Harold Baker (Birmingham), T. Birtles (Warrington), Boak & Sons (Driffield), W. J. Byrne (Richmond), Chancellor & Son (Dublin), W. Davey (Harrogate), J. E. Eddison (Leeds), J. Fergus (Largs, Scotland), Wm. Gill (Colchester), Guy & Co. (Cork), T. Illingworth (Halifax), R. Keene (Burton-on-Trent), T. N. Langton (Sheffield), Jno. Martyn (Southwold), Donald McIver (Leeds), H. S. Mendelssohn (London), John Moffat (Edinburgh), F. Whaley (Doncaster), G. V. Yates (Sheffield). *Auditors*—Harold Baker (Birmingham) and J. A. Draycott (Birmingham). *Hon. Treasurer*—W. Brookes (Manchester). *Hon. Secretary*—T. Bromwich (Bridgnorth). *Secretary*—D. J. O'Neill, 47 Charlotte Road, Birmingham.

Newton Heath Camera Club.—(ESTABLISHED 1893.)—Meetings are held a the Wesleyan School, Oldham Road. *President*—W. T. Evans. *Vice Presidents*—R. Fellows and W. J. Cresswell. *Treasurer*—J. Moodie. *Secretary*—J. Fortune, 844 Oldham Road, Newton Heath.

Newtownards Camera Club.—(ESTABLISHED 1894.)—Meetings are held at Regent Street Hall, Newtownards. *President*—Hugh Conway, B.A. *Vice-President*—S. H. Simms. *Committee*—Miss Jamison, Miss Johnston, — Paden, A. H. Moore, George Dixon. *Treasurer*—William McCulloch. *Secretary*—Thomas Drake, Hardford Lodge, Newtownards.

Northamptonshire Natural History Society and Field Club (Photographic Section).—(ESTABLISHED 1876.)—Meetings held at 8 Abington Street, Northampton. *President*—H. Manfield. *Secretaries*—G. Nichols and C. H. Dorman, 51 Abington Street, Northampton.

North Middlesex Photographic Society.—(ESTABLISHED 1886.)—Meetings held at Jubilee House, Hornsey Road, London, N. *President*—J. C. S. Mummery. *Vice-Presidents*—W. B. Goodwin, A.R.I.B.A., and E. R. Mattocks. *Council*—J. Addison, A. J. Golding, C. O. Gregory, A. J. Johnson, A. H. Lisett, J. MacIntosh, J. W. Marchant, F.R.P.S., J. A. Meen, C. R. Steele, H. Stuart. *Hon. Librarian*—F. W. Cox. *Treasurer*—Henry Smith. *Secretary*—J. Durston, 51 Landrock Road, Hornsey, N. *Assistant Secretary and Curator*—W. J. Simpson.

North Staffordshire Photographic Society.—(ESTABLISHED 1888.)—Meetings held at the Higher Grade Schools, Hanley. *President*—Bernard Howson. *Vice-Presidents*—E. B. Wain, William Hampton, H. M. Hornby, H. B. Steele. *Council*—A. E. Hils, W. E. Leek, F. C. Powell, Dr. Predergast, G. S. Turner, W. A. Meigh, E. Marks, H. P. Hopkins. *Treasurer*—Bernard Howson. *Joint Hon. Secretaries*—W. H. Walley, Queen Street, Burslem, and J. W. Moore, Tontine Square, Hanley.

Oban Amateur Photographic Society.—(ESTABLISHED 1892.)—Place of Meeting, Oban. *President*—M. A. Scott. *Vice-President*—John Maclaine. *Committee*—President, Vice-President, Secretary and Treasurer, D. Campbell Munro, John Anderson, jun. *Hon. Secretary and Treasurer*—Samuel Lawrence, Chemist, Oban.

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Oldham Photographic Society.—(ESTABLISHED 1867.)—Meetings held at the Lyceum, Union Street, Oldham. *President*—James Brooks. *Vice-President*—James Hall. *Committee*—T. Burton, J. S. Dronsfield, J.P., J. Greaves, jun., C. A. Hempstock, F. Megson, W. A. Nash, R. T. Taylor, J. Fullalove. *Treasurer*—Tom Heywood. *Hon. Secretary*—Thomas Widdop, 17 Queen Street, Oldham.

Oxford Camera Club.—(ESTABLISHED 1894.)—Meetings held at the University Museum. *President*—Sir William J. Herschel, Bart. *Vice-Presidents*—Miss Acland, Colonel Impey, E. A. Ryman Hall, V. P. Sells. *Committee*—T. E. Horrigan, E. C. H. Jessop, T. Minn, G. Shelton, Dr. M. D. Stark, Miss Venables, J. B. Wilson. *Treasurer*—R. A. R. Bennett. *Secretary*—George W. Norton, 13 Park Terrace, Oxford.

Oxford University Photographic Society.—(ESTABLISHED 1882.)—Headquarters, 24 Friars Entry, Oxford. *Secretary*—H. W. Hallifax, Balliol College, Oxford.

Paisley Photographic Society.—(ESTABLISHED 1857, REORGANIZED 1885.)—Rooms, 9 Gauze Street, Paisley. *Hon. Presidents*—H. H. Smiley and Stewart Clarke. *Hon. Vice-Presidents*—Robert Harris, James Donald, jun., James Barr, A. F. McCallum. *President*—Thomas Rastall. *Vice-President*—Robert Ferrier. *Council*—Edward Cook, James Mure, Charles Glassford, Robert Milne, James Reid, and James Arthur; Lantern Section: David B. Jack, James Mure, Charles Glassford. *Treasurer*—David B. Jack. *Secretary*—Robert M. Alexander, 2 Gordon Place, Paisley.

Peterborough Photographic Society.—(ESTABLISHED 1887.)—Meetings held at the Bedford Temperance Hotel. *President*—G. Kirkwood, M.D. *Vice-Presidents*—Dr. T. J. Walker, E. Worthington, G. W. Leigh. *Committee*—T. J. Calcutt, W. H. Pentrey, J. F. Perkins, J. Scotney, A. C. Taylor. *Treasurer*—W. Atkinson. *Secretary*—A. W. Nicholls, 11 Cromwell Road, Peterborough.

Photographic Club.—(ESTABLISHED 1879.)—Meetings are held at Anderton's Hotel, Fleet Street, London, E.C., every Wednesday evening at Eight o'clock. *Trustees*—Frank Haes and Alexander Cowan. *Committee*—E. Crofton, R. P. Drage, E. W. Foxlee, A. Mackie, E. A. Newell, W. D. Welford, J. B. B. Wellington, J. R. Williams. *Recorder* (*pro tem.*)—W. D. Welford. *Curator and Librarian*—Charles Wallis. *Hon. Secretary and Treasurer*—F. A. Bridge, East Lodge, Dalston Lane, London, N.E.

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Photographic Convention of the United Kingdom.—(ESTABLISHED 1886.)—Meeting at Glasgow in July, 1898, under the Presidency of John Stuart. Retiring President (Great Yarmouth, 1897), F. P. Cembrano. The Photographic Convention was founded in 1885 for the advancement of photography, and to afford opportunities for personal intercourse and exchange of ideas amongst those interested in the art, from all parts of the United Kingdom. The Council of the Convention is empowered to make grants from the surplus funds under its control, in aid of photographic research. Meetings have been held in the following centres:—Great Yarmouth, Leeds, Shrewsbury, Dublin, Plymouth, Edinburgh, Bath, Chester, London, Birmingham, Glasgow, Derby. *Past Presidents*—H. P. Robinson, A. Haddon, Sir Howard Grubb, George Mason, William Bedford, G. Davison, C. H. Bothamley, Andrew Pringle, J. Traill Taylor. *Former Hon. Secretaries*—J. J. Briginshaw, F. P. Cembrano, R. P. Drage. *Council*—Surgeon-Major Adcock (Great Yarmouth), Harold Baker (Birmingham), Thomas Bedding (London), C. H. Bothamley (Weston-super-Mare), J. J. Briginshaw (London), F. A. Bridge (London), Alexander Cowan (London), W. Crooke (Edinburgh), Sir Howard Grubb (Dublin), Herbert Denison (Leeds), A. Haddon (London), H. M. Hastings (London), A. Horsley Hinton (London), Sydney Keith (London), Paul Lange (Liverpool), C. Phipps Lucas (London), Percy Lund (Bradford), J. L. Lyell (London), Major Lysaght (London), George Mason (Glasgow), A. F. Mowll (Liverpool), W. W. Naunton (Shrewsbury), J. Porritt (Leicester), Andrew Pringle (London), H. P. Robinson (Tunbridge Wells), J. C. Ruthven (Dublin), A. Seaman (Chesterfield), John Stuart (Glasgow), Henry Sturmey (Coventry), W. Taylor (Leicester), Alexander Tate (Belfast), E. J. Wall (London), J. H. Walker (Leeds), H. Snowden Ward (London), G. Watmough Webster (Chester), S. B. Webber (London), W. D. Welford (London), J. B. B. Wellington (London), A. Werner (Dublin), F. W. Williams (Shrewsbury). Martin J. Harding (Shrewsbury), Godfrey Bingley (Leeds), Harvey George (Great Yarmouth), are *ex-officio* members of Council for one, two, and three years respectively. *Trustees*—F. A. Bridge and S. B. Webber. *Auditors*—Thomas Fall and John Howson. *Hon. Secretary and Treasurer*—F. A. Bridge, East Lodge, Dalston Lane, London, N.E.

Photographic Society of Ireland.—(ESTABLISHED 1854.)—Meetings held at 35 Dawson Street, Dublin. *President*—Alfred Werner, F.R.P.S. *Vice-Presidents*—J. A. C. Ruthven, A.M.I.C.E., and J. H. Hargrave, B.A. *Council*—A. M. Geddis, James Simpson, J. Armstrong, J. E. Matthews, J. M. Keogh, H. Goodwillie, R. M. Inglis, J. H. Gane, E. R. McC. Dix. *Hon. Treasurer*—William Bewley, B.A. *Hon. Secretary*—Victor E. Smyth, 7 Uxbridge Terrace, Ranelagh, Dublin. *Assistant Secretary*—W. F. Cooper, 194 Clonliffe Road, Dublin.

Photographic Survey of Warwickshire.—(ESTABLISHED 1890.)—Meetings held at Birmingham. *President*—Sir J. B. Stone, M.P. *Vice-Presidents*—Jethro A. Cossins and Jonathan Pratt. *Treasurer*—G. F. Lyndon, J.P. *Secretaries*—J. H. Pickard, Priory Road, Edgbaston, Birmingham; and C. J. Fowler, Court Mount, Erdington.

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Photographic Salon.—(ESTABLISHED 1892.)—Meetings held at the Dudley Gallery, Piccadilly, W. *Committee*—A. Alexandre, Bernard Alfieri, J. Craig Annan, Ernest R. Ashton, Lionel C. Bennett, J. S. Bergheim, Shapoor N. Bhedwar, Valentine Blanchard, Maurice Brémard, Rowland Briant, Tom Bright, T. M. Brownrigg, Maurice Bucquet, Arthur Burchett, A. Buschbek, W. A. Cadby, Eustace Calland, H. Hay Cameron, Lyonel Clark, Francis Cobb, Lewis Cohen, Hector Colard, Walter L. Colls, Reginald W. Craigie, William Crooke, L. David, George Davison, S. Day, Robert Demachy, R. Eickemeyer, Charles Emanuel, J. Gale, John Pattison Gibson, Karl Greger, J. C. M. Grove, Hugo Henneberg, A. Hildesheimer, Alfred Horsley Hinton, Frederick Hollyer, Heinrich Kühn, George H. James, Rouillé Ladevèze, Rev. F. C. Lambert, Baron Alfred Liebieg, Thomas Manly, Alfred Maskell, Charles Moss, C. Puyo, H. P. Robinson, Ralph Robinson, Baron N. de Rothschild, Lyddell Sawyer, Otto Scharf, Alfred Stieglitz, J. Strakosch, Frank M. Sutcliffe, Carl Ulrich, Hans Watsek, J. B. B. Wellington, H. Van der Weyde, B. Gay Wilkinson, jun.; W. Willis. *Hon. Secretary*—Alfred Maskell, Dudley Gallery, Piccadilly, W.

Plymouth Photographic Society.—(ESTABLISHED 1895.)—Affiliated with the Royal Photographic Society. Meetings are held each alternate Friday at the Mechanics' Institute, Princess Square, Plymouth. *President*—E. H. Micklewood. *Vice-Presidents*—W. Aver Duncan and H. S. Hill. *Committee*—W. E. Drinkwater, — Johns, F. Johnson, J. Davy Turney, J. Truand Trend. *Auditor*—W. H. Mayne. *Treasurer*—Thomas Stanning. *Secretary*—W. H. Harris, 91 Coburg Street, Plymouth.

Plympton Photographic Society.—(ESTABLISHED 1893.)—*President*—C. Aldridge, M.D. *Council*—Dr. Ellery, Dr. Stevens, H. Tritton, J. Brookny Rowe. *Secretary and Treasurer*—T. H. Wilks, Plympton House, Plympton, Devon

Polytechnic Photographic Society.—Meetings are held every Wednesday at 309 Regent Street, in Room 14, at 8.15 p.m. Lantern night, last Wednesday in each month. *President*—Howard Farmer. *Committee*—G. Goose, J. E. Galliford, R. Hill, W. T. Pearson, W. M. Weir, F. Wilson. *Treasurer*—H. Bacon. *Hon. Secretary*—F. W. Parker 76 Patshull Road, N.W. *Assistant Hon. Secretary*—H. A. Baxter.

Poole Natural History Society.—(ESTABLISHED 1888, THE PHOTOGRAPHIC SECTION 1897.)—Meetings are held at the Free Library Buildings, Poole. *President*—Reginald Aldridge. J.P. *Vice-Presidents*—Dr. W. Hooper Masters and Dr. William Turner, J.P. *Committee*—A. D. Moullin, Leonard W. Pike, Owen Carter, W. H. Hunt. *Treasurer*—Charles Carter, J.P. *Secretary*—John M. Henderson, Belle Vue, Hamworthy, Poole.

Postal Camera Club.—(ESTABLISHED 1894.)—A circulating Club for the criticism of prints by members, and mutual aid on matters photographic. The portfolios (of which there are four) circulate regularly. Prints are inserted and withdrawn by the members as the portfolio receives them monthly. *Hon. Secretary*—W. R. Bland, Duffield, Derby.

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Postal Photographic Club.—(ESTABLISHED 1886.)—Headquarters, Walton Manor Lodge, Oxford. Formed for the circulation and exchange of prints, and discussions on various matters of photographic interest. Criticisms are made on the prints circulating by the members. Prints are inserted by members as the cases reach them (about once a month). *Secretary and Treasurer*—Reginald A. R. Bennett, M.A. (Oxon.), Walton Manor Lodge, Oxford.

Postal Photographic Competition Club.—(ESTABLISHED 1893.)—Circulating Club for advanced workers only. *Secretary*—Hugo Meynell, Farley, Cheadle, Stoke-on-Trent.

Prescot and District Amateur Photographic Association.—(ESTABLISHED 1897.)—Meetings held at Bank Buildings, Derby Street, Prescot. *Committee*—J. Blaiklock (Chairman), F. V. Driffield (Vice-Chairman), A. Tracey, F. R. Thomas, J. S. Robinson, E. Martin, J. Whitaker, E. Davies. *Hon. Treasurer*—C. T. Willis. *Hon. Secretary*—W. Langley, Plumbs House, Scotch Lane, Prescot.

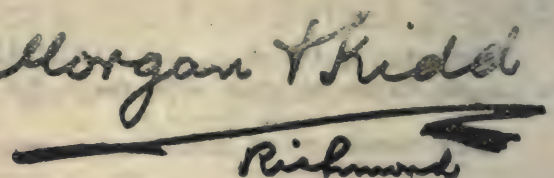
Preston Scientific Society Photographic Section.—(ESTABLISHED 1896.)—Meetings held at the Society's Room, Cross Street. *Chairman*—James Busby. *Committee*—Henry Atherton, James Atherton, C. E. Gray, C. Carter, J. Marsden, Dr. Derham. *Secretary*—Frank Ketton, Oak Cottage, Fulwood, Preston.

Putney Photographic Society.—(ESTABLISHED 1890.)—Meetings are held at the Schoolroom, 102 High Street, Putney, S.W. *President*—The Hon. Baron Pollock. *Vice-Presidents*—John A. Hodges, F.R.P.S., H. Kimber, M.P., Dr. W. J. Sheppard. *Council*—F. Chasemore, Dr. J. F. Farrar, H. Faulkner, T. Gilbert, W. F. Gorin, William Martin, W. C. Plank, Dr. C. Wyman, L. S. Zachariasen. *Treasurer*—William Martin. *Secretaries*—William Martin, 4 Lower Parkfields, Putney, S.W., and W. J. Colebrook, 18 Festing Road, Putney, S.W.

Ramsgate Camera Club.—(ESTABLISHED 1894.)—Meetings are held at the Victoria Hotel, Ramsgate. *Vice-Presidents*—E. E. Wastall, J.P., W. T. Davey, W. C. Bull. *Committee*—F. B. Bear, T. J. Dutton, A. F. Dawkins, G. Hoile, A. W. Kingsland, W. T. Lambert, T. B. Smith, J. M. Vickery, H. G. Holloway, R. J. Smith. *Treasurer*—Frederick J. Bear, jun. *Secretary*—Frederick J. Bear, 41 Queen Street, Ramsgate.

Redditch Institute (Photographic Section) (late Redditch Amateur Photographic Society).—Meetings are held at the Redditch Institute. *Chairman*—H. Page, M.D. *Hon. Secretary*—Alfred Parr, The Hollies, Beoley.

Richmond Camera Club.—(ESTABLISHED 1890.)—Meetings held at the Greyhound Hotel, Richmond, Surrey. *Patron*—H.H. the Duke of Teck. *President*—F. P. Cembrano. *Vice-Presidents*—E. D. Purcell and G. Ardaseer. *Committee*—J. H. Alabaster, C. J. M. Child, J. D. Gibson, J. W. St. John Hunt, F. Neville, G. O. Richards. *Treasurer*—J. B. Huddy. *Secretary*—C. H. Davis, 97 Church Road, Richmond, Surrey.



Rochdale and District Photographic Society.—(ESTABLISHED 1890.)—*President*—J. A. Bright. *Vice-Presidents*—Alderman J. R. Heape, Rev. T. P. Spedding, C. Fairbank, F. W. Turner, Dr. W. Mills, Colonel C. M. Royds, M.P. *Committee*—G. H. Bray, F. Greenwood, G. Smith, G. A. Close, E. H. Seanor, W. Ingham, D. E. Brooks, R. Whitehead, J. Fitton, J. S. Johnson. *Treasurer*—R. J. Mills. *Secretaries*—H. & W. Bamford 242 Yorkshire Street, Rochdale.

Rochester Naturalists' Club (Photographic Section).—(ESTABLISHED 1882.)—Meetings held at the Mathematical School, Rochester. *Secretary*—J. Hepworth, Linden House, Rochester.

Rock Ferry Camera Club.—(ESTABLISHED 1895.)—Meetings are held at St. Peter's Hall, Rock Ferry. *Committee*—C. Sunderland, A. R. Jenkins, C. Hill, Hamilton Williams. *Treasurer*—R. A. Armstrong. *Secretary*—J. W. Kelly, Egerton Park, Rock Ferry.

Rodley Photographic Society.—(ESTABLISHED 1894.)—Meetings are held at Rodley. *President*—W. Broughton. *Committee*—J. W. Nicholson, H. Hardaker, J. Slater, Walter Smith, Tom Lambert. *Treasurer*—H. Crossley. *Secretaries*—H. Crossley and John Hardaker, Rodley, near Leeds.

Romford and District Photographic Society.—(ESTABLISHED 1894.)—Meetings held at High Street, Romford. *President*—W. E. Gibb, J.P. *Vice-President*—A. Money Wigram. *Committee*—C. Hussey, A. G. Lucas, C. S. Marsh, A. E. Michell, C. G. Church, T. J. Day, G. W. Corbell, C. G. Reed, R. T. Aldous. *Treasurer*—J. W. Lasham. *Secretary*—A. J. Ormiston, Stylehurst, Romford.

Rossendale Camera Club.—(ESTABLISHED 1892.)—Meetings held at the Blue Ribbon Club, Rawtenstall. *President*—J. K. Butterworth. *Vice-Presidents*—J. Taylor and W. T. Entwistle. *Committee*—Messrs. Poynton, Nelson, Grime, Simpson, and Taylor. *Treasurer*—W. A. Fenton. *Secretary*—E. K. K. Taylor, 23 Bank Street, Rawtenstall, near Manchester.

Rotherham Photographic Society.—(ESTABLISHED 1889.)—*President*—Dr. Baldwin. *Vice-Presidents*—E. Isle Hubbard, J. Leadbeater, J. Turner. *Council*—The Officers, and R. H. Law, J. Clarke, F. Oldham, F. Moore. *Hon. Treasurer*—A. S. Lyth. *Hon. Secretary*—H. C. Hemmingway, Grosvenor Terrace, Tooker Street, Rotherham. *Assistant Secretary*—C. E. Parkin.

Royal Cornwall Polytechnic Society.—(ESTABLISHED 1833.)—Meetings held at Falmouth. *President*—T. Bedford Bolitho, M.P. *Vice-Presidents*—Right Hon. Viscount Falmouth, E. W. Bayley, F.R.S., F.L.S., J. D. Enys, F.G.S., J. Passmore Edwards, Professor T. E. Thorpe, F.R.S., J. Bevill Fortescue, William Brookes, John Stephens, M. H. Williams, Stanhope Forbes, A.R.A., John J. Berriger, F.C.S., George H. Fox. *Treasurer*—R. Hilton Tweedy. *Secretary*—Edward Kitto, F.R.Met.S., The Observatory, Falmouth.

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Scarborough and District Photographic Society.—(ESTABLISHED 1892.)—Meetings held in the Museum, Scarborough. *President*—Dr. Frederick Dale. *Vice-President*—J. H. Rowntree. *Committee*—Miss M. McAllum, Miss Graham, Dr. Harvey, J. C. Thompson, J. Whitfield, E. R. Cross. *Treasurer*—J. G. Megginson. *Hon. Secretary*—H. Wanless, 31 Westborough, Scarborough.

Selby Camera Club.—(ESTABLISHED 1878.)—Meetings are held at the Club Rooms, Park Street. *President*—William Rawling. *Vice-Presidents*—J. C. Thompson and J. T. Atkinson. *Council*—Messrs. Cooper, Allison, Watson, Morley. *Secretary and Treasurer*—W. N. Cheesman, The Crescent, Selby.

Shaw Church Institute Photographic and Art Society.—(ESTABLISHED 1888.)—Meetings held at the Shaw Church Institute. *President*—H. Illingworth. *Vice-President*—J. H. Broadbelt. *Committee*—J. R. Royds, J. Watson, J. Clarkson. *Secretary and Treasurer*—John Maiden, 91 Rochdale Road, Shaw.

Sheerness Camera Club.—(ESTABLISHED 1896.)—Meetings held at 3 Russell Street. *President*—J. J. King-Salter. *Vice-President*—J. Small. *Committee*—E. J. White, W. Shutt, A. Doran. *Hon. Treasurer*—W. H. Jago. *Hon. Secretary*—Arthur D. L. Hughes, 14 Edward Street, Sheerness-on-Sea.

Sheffield and Hallamshire Photographic Society.—(ESTABLISHED 1896.)—Meetings are held at the Crown and Anchor Hotel, Fitzwilliam Street, Sheffield. *President*—L. Britton. *Vice-President*—G. H. Bagshaw. *Committee*—F. Evans, R. Heathcote, J. Cartledge, F. Oakes, J. Cunningham, Jos. Robinson, — Birch, — Pashley. *Treasurer*—Jno. W. Mottershaw. *Secretary*—Fred. Lowe, 361 Sharrow Vale Road, Sheffield.

Sheffield Photographic Society.—(ESTABLISHED 1875.)—Meetings are held at the Masonic Hall, Surrey Street, Sheffield. *President*—G. Tomlinson. *Vice-Presidents*—T. Firth, D. C. Brooke, S. Camp. *Council*—W. T. Furniss, G. H. Day, H. Ellis, J. W. Charlesworth, C. F. Brindley. *Librarian*—T. G. Hibbert. *Reporter*—J. H. Lyon. *Treasurer and Assistant Secretary*—Joseph Smith. *Secretary*—George W. Blackwell.

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Sheffield Optical Lantern Society.—(ESTABLISHED 1891.)—Meetings held at St. Paul's Schoolroom, Cambridge Street, Sheffield. *President*—Dr. Manton. *Vice-Presidents*—J. H. Lygo, J. Clowes, H. Staniforth, J. W. H. Wilson, A. Nicholson. *Treasurer*—J. W. Copley. *Secretary*—T. G. F. Allen, 59 Melrose Road, Sheffield.

Shields and District Camera Club.—(ESTABLISHED 1893.)—Meetings held at the Studio, Albion Road, North Shields. *President*—Thomas Simpson. *Vice-Presidents*—Miss Phillips and R. W. Tate. *Committee*—William Bell, J. Guy, R. Newham, J. Blyth. *Secretary and Treasurer*—William S. Irvin, Bedford House, North Shields.

Shropshire Camera Club.—(ESTABLISHED 1886.)—Meetings held at Castle Chambers, Shrewsbury. *President*—W. E. Harding. *Vice-Presidents*—M. J. Harding, F. W. Williams, W. D. Haydon. *Council*—F. R. Armitage, W. Bowdler, C. W. Ebrall, R. J. Irwin, P. W. Pilcher. *Treasurer*—Wallace Heath. *Secretary*—J. L. Della Porta, The Mount, Shrewsbury.

Society for the Encouragement of Arts, Manufactures, and Commerce.—(FOUNDED IN 1754. INCORPORATED BY ROYAL CHARTER IN 1847.)—Meetings are held at John Street, Adelphi, London, W.C. *Council*—H.R.H. the Prince of Wales, K.G. (President of the Society), Major-General Sir Owen Tudor Burne, G.C.I.E., K.C.S.I. (Chairman of the Council), H.R.H. the Duke of Saxe-Coburg-Gotha, K.G. (Vice-President), H.R.H. the Duke of York, K.G. (Vice-President), Sir Frederick Abel, Bart., K.C.B., D.C.L., F.R.S. (Vice-President), Duke of Abercorn, K.G., C.B. (Vice-President), Captain W. de W. Abney, R.E., C.B., F.R.S. (Vice-President), Sir William Anderson, C.B., D.C.L., F.R.S. (Vice-President), The Attorney-General, G.C.M.G., Q.C., M.P. (Vice-President), Sir Steuart Colvin Bayley, K.C.S.I., C.I.E., Lord Belhaven and Stenton, Sir George Birdwood, K.C.I.E., C.S.I., LL.D., M.D. (Vice-President), Sir Edward Birkbeck, Bart. (Vice-President), Sir Courtenay Boyle, K.C.B. (Vice-President), Sir Frederick Bramwell, Bart., D.C.L., F.R.S. (Vice-President), Michael Carteighe, B. Francis Cobb (Treasurer), Right Hon. Viscount Cross, G.C.B. (Vice-President), Right Hon. George N. Curzon, M.P. (Vice-President), Lewis Foreman Day, Major-General Sir John F. D. Donnelly, K.C.B. (Vice-President), Hon. Sir Charles W. Fremantle, K.C.B. (Vice-President), Sir Douglas Galton, K.C.B., D.C.L., F.R.S. (Vice-President), Joseph G. Gordon, Henry Graham Harris, Sir Villiers Lister, K.C.M.G. (Vice-President), The Lord Chancellor (Vice-President), James Sewell Neville, William Henry Preece, C.B., F.R.S. (Vice-President), Sir Owen Roberts, M.A., D.C.L., F.S.A. (Treasurer), Professor William Chandler Roberts-Austen, C.B., F.R.S. (Vice-President), Earl of Rosebery, K.G., K.T. (Vice-President), Alexander Siemens, Sir Donald A. Smith, G.C.M.G., LL.D. (Vice-President), Sir Douglas Straight, William Luson Thomas, Professor John Millar Thomson, F.R.S. *Auditors*—J. O. Chadwick & Co. *Accountant*—Howard H. Roome. *Secretary*—Sir Henry Trueman Wood, M.A. *Assistant Secretary*—Henry B. Wheatley, F.S.A.

for Skilful Enlarging by Bromide Process

Smethwick and District Photographic Society.—(ESTABLISHED 1895.)—Meetings held at the Hill Street Schools, Smethwick. *President*—Dr. J. Pitt. *Committee*—F. Read, — Gregory, A. Jeffery, G. Lee, W. Howlett. *Treasurer*—Mr. Grant. *Secretary*—A. Highfield, 63 Regent Street, Smethwick.

South London Photographic Society.—(ESTABLISHED 1888.)—Meetings held on first and third Mondays at Hanover Hall, Hanover Park, Rye Lane, Peckham, S.E. Affiliated with the Royal Photographic Society. *Patron*—His Grace the Duke of Newcastle. *Vice-Presidents*—H. E. Farmer, S. W. Gardner, Maurice Howell, T. G. Munyard, L.R.C.P., &c., W. F. Slater, W. D. Welford. *Committee*—W. C. Boyce, E. R. Bull, C. F. Dickinson, H. Esler, A. Fellows, F. W. Grigg, W. R. Jarvis, B. Lyon, G. A. Maull. *Curator*—G. H. Moss. *Hon. Lanternist*—J. T. French. *Captain of the Cylist Members*—E. G. Ruckes. *Vice-Captain*—F. A. Cooper. *Delegates to the Affiliation of Photographic Societies*—Charles H. Oakden and W. D. Welford. *Hon. Treasurer*—E. A. Whitby. *Hon. Secretary*—Charles H. Oakden, 30 Henslowe Road, East Dulwich, S.E. *Hon. Assistant and Excursion Secretary*—A. E. Allen, 27 Princes Square, Kennington, S.E.

Southport Social Photographic Club.—(ESTABLISHED 1890.)—Meetings are held at The Studio, 15 Cambridge Arcade. *President*—Charles H. Brown. *Vice-Presidents*—D. E. Benson, A.M.I.C.E., and H. L. Hawksley, L.R.C.P. *Committee*—Henry Ball, W. P. Brown, H. J. Heaton, T. Ormrod, W. Rees. *Treasurer*—James R. Cane, A.P.S. *Secretary*—George Cross, 15 Cambridge Arcade, Southport.

Southsea Amateur Photographic Society.—(ESTABLISHED 1888.)—Meetings held at 5 Pembroke Road, Portsmouth. *President*—A. Fisher, A.S.A. *Vice-President*—G. Whitefield. *Committee*—Colonel C. Wilkinson, R.E., F.R.P.S., Colonel H. W. B. Bruno, C. H. Grant, Dr. C. H. Newby, F.R.C.S., G. Wood, A.R.I.B.A., F. J. Mortimer. *Treasurer*—Dr. F. Lord. *Secretary*—H. T. Lilley, M.A., 22 Pelham Road, Southsea.

Spalding and District Photographic Society.—(ESTABLISHED 1894.)—Meetings are held at Spalding. *President*—W. A. Southwell. *Vice-Presidents*—G. F. Barrell and A. K. Maples. *Committee*—H. B. Massey, E. M. M. Smith, W. Stedmans. *Secretary and Treasurer*—E. Wightman Bell, F.C.S., High Bridge, Spalding.

Stafford Photographic Society.—(ESTABLISHED 1895.)—Meetings held at the Y.M.C.A. Rooms, Stafford. *President*—George Wray. *Vice-Presidents*—H. E. Burn. *Committee*—W. Kirkham, H. Cliff, T. Davies, F. Jenkinson. *Secretary and Treasurer*—Frank Cliff, 11 Gaol Gate Street, Stafford.

St. Bartholomew's Hospital Photographic Society.—(ESTABLISHED 1886.)—Headquarters, St. Bartholomew's Hospital. *Vice-Presidents*—Dr. Lewis Jones and F. Womack. *Hon. Secretary*—P. G. Harvey.

Stereoscopic Club.—(ESTABLISHED 1890.)—Meetings are held at Brooklands Hotel. *President*—James Whitelegg. *Treasurer*—F. Hallewell. *Secretary*—W. I. Chadwick, Westwood, Sale, Cheshire.

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Stereoscopic Society.—(ESTABLISHED 1893.)—*President*—W. W. Stainthorpe, M.D., J.P. *Vice-President*—Ringrose Atkins, M.A., M D, *Secretary and Treasurer*—B. Diveri, B.A., Huntly, N.B.

St. Helens and District Photographic Society.—(ESTABLISHED 1894.)—Headquarters, Wolverhampton House, Church Street, St. Helens. *Vice-Presidents*—Colonel Gamble, C.B., D. McKechnie, J.P., F. R. Dixon-Nuttall, J.P., R. G. Brook, W. Thomason, C. H. Jolliffe, Rev. J. W. Willink. *Council*—J. Cammack, L. West, J. Westworth, J. G. Wallbridge, W. W. Gandy, A. M. Booth, D. Thomason, J. C. Nicol. *Hon. Secretary*—J. G. Wallbridge, 52 Liverpool Road, St. Helens, Lancashire.

St. Michael's Junior Photographic Society.—(ESTABLISHED 1896.)—Meetings held at the Church Room, Belgrave Road. *President*—Rev. H. Gresford Jones, M.A. *Secretary*—Henry Goldstone, 66 Alwyn Street, St. Michael's, Liverpool.

Stockport Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Mechanics' Institute. *President*—Colonel Turner, J.P. *Vice-Presidents*—G. Hidderley, E. Johnson, A. M. Gourley. *Council*—J. G. Howarth, J. Rushton, J. Middleton, R. J. Bailey, J. Lingard, J. Brelsford, W. H. Atherton, H. D. F. Dobson, J. N. Dempsey. *Treasurer*—Thomas Bedford. *Secretary*—Thomas Allott, 108 Shaw Heath, Stockport.

Stoneycroft Camera Club.—(ESTABLISHED 1895.)—Meetings are held in the People's Hall, 509 Prescot Road, Stoneycroft, Liverpool. *President*—R. H. Mitchell, A.P.S.Lond. *Vice-President*—W. Bennett. *Council*—J. Canavan, C. E. Hancox, F. Walmsley, F. Drakeford, H. Johnson. *Treasurer*—T. Reginald Olver. *Secretary*—S. Roger-Midgley, 3 Derby Lane, Stoneycroft, Liverpool.

Streatham Photographic Society.—(ESTABLISHED 1895.)—Meetings held at 14 Greyhound Lane, Streatham Common. *President*—Dr. E. Gordon Hull. *Vice-President*—J. D. B. Lewis. *Committee*—H. Taylor, W. Bennett, E. R. Creed, T. Moyser, T. Benger, H. G. Coombs. *Lantern-ist*—H. R. Coombs. *Secretary*—John J. Laws, Chemist, 14 Greyhound Lane, Streatham, S.W. *Assistant Secretary*—A. W. James, 36 Tankerville Road, Streatham, S.W.

Sun & Company.—(ESTABLISHED 1886.)—A Postal Photographic Society for advanced workers, limited to forty amateurs, for the monthly circulation and criticism of photographs, entirely the work of members, and for a general interchange of ideas, with a view to mutual advancement in the science and art of photography. *Committee*—F. de Paula, Wallace Heath, Henry Newson, and the Hon. Secretary. Application for vacancies should be made to the Hon. Secretary, Martin J. Harding, 6 Havelock Road, Shrewsbury.

Sunbeam Postal Photographic Society.—(ESTABLISHED 1894.)—An ever-circulating portfolio society, monthly portfolios for mutual criticism, exchanges, and discussions, with occasional competitions among members. *Secretary and Conductor*—R. W. Copeman, Kuklos Cottage, Henstridge, Blandford.

For Finest Enlarging in Carbon or Platinotype

Sunderland Photographic Association.—(ESTABLISHED 1888.)—*President*—W. Milburn. *Vice-Presidents*—W. Bartram and C. E. Cowper. *Council*—G. Bartram, A. G. Boulton, J. W. Broderick, W. Horan, E. R. Kirkley, A. Peddie, R. G. Posgate, W. Pratt. *Treasurer*—T. Walton. *Secretary*—W. J. Pope, New Arcade, Sunderland.

Sutton Photographic Club (in connexion with the Sutton Scientific and Literary Society).—(RECONSTITUTED 1897.)—*Chairman*—J. A. Formoy, F.R.A.S. *Vice-Chairman*—E. De Clifford, B.A. *Secretary*—A. P. Hoole, The Willows, Sutton, Surrey.

Talbot Album Club.—(ESTABLISHED 1886.)—*Secretary*—Frederick H. Davies, Shustoke House, Stechford, Birmingham.

Technical College, Finsbury, Photographic Society.—(ESTABLISHED 1886.)—Meetings held at the Finsbury College, Leonard Street, City Road, E.C. *President*—R. Meldola, F.R.S., F.I.C., F.C.S. *Vice-President*—J. Castell Evans, F.I.C. *Treasurer and Librarian*—T. H. Norris, A.I.C. *Secretary*—W. L. C. Butter, 10 Jackson Street, Woolwich Common.

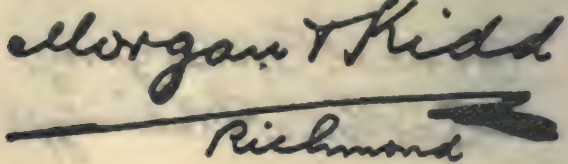
The Park Photographic Society.—(ESTABLISHED 1894.)—Meetings held at the Domestic Mission, Mill Street, Dingle, Liverpool. *President*—T. Lee Lloyd. *Vice-Presidents*—Dr. Foulston and R. Coventry. *Treasurer*—Edward Warwick. *Secretary*—Alexander Mair, 337 Grafton Street, Liverpool.

Tunbridge Wells Amateur Photographic Association.—(ESTABLISHED 1887.) Meetings held at the Club Room, Mechanics' Institute. *Patron*—Sir David Salomons, Bart., M.A., D.L., J.P. *President*—Francis G. Smart, M.A., F.S.A., F.L.S. *Vice-Presidents*—Rev. A. T. Scott, M.A., E. R. Ashton, C. Leeson Prince, F.R.A.S., F.R.Met.S. *Committee*—G. W. Howard, F.C.S., J. W. Morgan, A. W. Pierson. *Hon. Auditor*—E. Catchpole. *Hon. Treasurer*—B. Whitrow. *Hon. Secretary*—Joseph Chamberlain, 14 Calverley Park Gardens, Tunbridge Wells.

Tyneside Camera Club.—(ESTABLISHED 1891.)—Meetings held at 50 Waller Street, Byker, Newcastle-on-Tyne. *President*—J. Brown. *Secretary*—Joseph Fraser McKie, 50 Waller Street, Byker, Newcastle-upon-Tyne.

Ulster Amateur Photographic Society.—(ESTABLISHED 1885.)—Meetings are held at the Museum, College Square, Belfast. *President*—John J. Andrew, L.D.S., F.C.S. *Vice-Presidents*—John Brown, William Gray, M.R.I.A., W. Redfern Kelly, M.R.I.A., F.R.A.S., James Leslie, Professor Letts, Ph.D., F.R.S.E., F.C.S., Cecil F. Shaw, M.A., M.D., James Stellox, Alexander Tate. *Committee*—Miss M. K. Andrews, A. H. M'Bride, F. J. Brill, John Woodside, J. H. Greenhill, M.Inst.E.E., Otto Jaffe, J.P, James M'Cleery, W. E. Williames. *Treasurer*—J. Campbell Carson. *Secretary*—James J. Hyde, Essex House, Strandtown, Belfast.

Uttoxeter Photographic Society.—(ESTABLISHED 1890.)—Meetings are held at Carter Street, Uttoxeter. *President*—Rev. C. F. Lowry Barnwell. *Vice-Presidents*—Hugo Meynell, F. Bolton, C. W. Lyon. *Committee*—S. Bamford, R. T. A. Hardy, H. Holmes, Hugo Meynell, A. Parker, C. J. Peto, C. Wallis. *Treasurer*—R. T. A. Hardy. *Secretary*—Rev. C. F. Lowry Barnwell, Stramshall Vicarage, Uttoxeter.



Vale of Llangollen Camera Club.—(ESTABLISHED 1893.)—Meetings held at Salop House. *President*—Ralph Darlington, F.R.G.S. *Vice-Presidents*—J. M. Corney and Joseph Hall. *Committee*—Hiram Davies, Sergeant Bagshaw, John H. Davies, Jonathan Edwards. *Treasurer*—Gomer Rowlands. *Secretary*—Herbert Victor Davies, Salop House, Llangollen.

Wakefield Photographic Society.—(ESTABLISHED 1891.)—Meetings held at the Church Institution, Westgate. *President*—W. T. Wilkinson. *Vice-Presidents*—Rev. Aspinall Addison and H. M. Briggs. *Committee*—A. W. Stansfield, J.P., Major Norwood, E. Miles, J. R. Shaw, J. H. Chaplain, W. Holmes, R. Robson. *Treasurer*—A. H. Roberts. *Secretary*—W. T. Wilkinson, 19 Queen Street, Wakefield.

Walsall Amateur Photographic Society.—(ESTABLISHED 1892.)—Meetings held at the Y.M.C.A., Walsall. *President*—John R. Cooper. *Committee*—W. H. Bullock, J. W. Carver, W. C. Checkley, B. Greatrex, W. A. Hubball, W. Meikle, S. A. Newman, F. Partridge, H. B. Smith. *Secretary and Treasurer*—E. A. Day, 14 Westbourne Road, Walsall.

Walthamstow Photographic Society.—(ESTABLISHED 1894.)—Meetings are held at Mission Cottage, Vestry Road, Walthamstow, on the first and third Mondays in each month (except Bank Holidays) at 8 p.m. *President*—W. A. Longmore. *Treasurer*—W. Houghton. *Committee*—J. G. Gallifford, P. Johns, J. H. Shaw, T. R. Nunn, E. W. Appleton, C. S. Scott. *Hon. Secretary*—W. E. Lane, 24 Prospect Hill, Walthamstow.

Walton (Liverpool) Photographic Society.—(ESTABLISHED 1889.)—Meetings held at the Walton Church Schools, Liverpool. *President*—F. Murphy. *Council*—Jno. Kennedy, Henry Sharrock, H. T. Livesley, C. W. McKie, Jno. Parke, George Latimer. *Secretary and Treasurer*—T. Bickerstaff, 79 Rawcliffe Road, Walton, Liverpool.

Warrington Amateur Photographic Society.—(ESTABLISHED 1887.)—Meetings are held at the School of Science, Wilson Patten Street, Warrington. *President*—John Fairhurst. *Vice-Presidents*—H. N. Houghton and T. Hesketh. *Council*—C. B. Aylward, H. Bond, J. Critchley, R. Graham, J. Harding, G. Kirby, H. Milling, T. Welsby, J. Lyon Whittle, W. Winstanley. *Treasurer*—P. Dalton. *Secretary*—D. S. Stone, Crosfield Street, Warrington.

Waterloo (Liverpool) Social Camera Club.—(ESTABLISHED 1893.)—*President*—J. T. Norman Thomas. *Council*—The Officers, with E. Rawlins and C. W. Budden. *Treasurer*—J. E. Hume. *Secretary*—G. D. Dean, The Dunes, Blundellsands, Liverpool.

West London Photographic Society.—(ESTABLISHED 1888.)—Meetings are held at the Broadway Hall, Hammersmith. *President*—G. F. Blackmore. *Vice-Presidents*—L. Selby, J. Wilson, W. A. Brown, C. Winter. *Council*—J. J. Adam, T. Coysh, J. E. Kellow, A. Beard, M. W. Cockerell, C. Dixon, W. Taylor. *Treasurer*—H. Selby. *Secretary*—Alfred Ebbs, 183 The Grove, Hammersmith, W.

For Artistic & Tasteful Finishing

West Surrey Photographic Society.—(ESTABLISHED 1887.)—Meetings held on Wednesdays at Stanley's Restaurant, Lavender Hill, Clapham Junction S.W. *Patron*—P. M. Thornton, M.P. *Hon. Members*—George Davison, B. Andrew Lillie, A. Maskell, J. Bond, Frank S. Murray. *President*—George H. James. *Vice-Presidents*—G. H. Seward, J. T. Price, J. Bulbeck. *Committee*—A. S. Angell, E. W. Burch, W. J. Channon, A. W. Curtiss, J. B. Dixon, H. P. Hoad, E. Pointon. *Hon. Librarian*—S. Payton. *Hon. Secretary and Treasurer*—W. H. Wilshere, 236 Lavender Hill, Clapham Junction, S.W. *Hon. Assistant Secretary* — G. Bottle, 55 Lavender Sweep, S.W.

Weymouth and District Camera Club.—(ESTABLISHED 1895.)—Meetings held at the Oddfellows' Hall, Market Street, Weymouth. *President*—Colonel R. H. Palmer, R.A., M.R.A.C. *Hon. Secretary*—Rev. E. C. Bennett, 10 Newberry Terrace, Weymouth.

Widnes Photographic Society.—(ESTABLISHED 1893.)—Meetings are held at the Drill Hall, Widnes. *President*—V. C. Driffield. *Vice-President*—G. J. Warner. *Council*—J. S. Sinclair, A. J. Squires, W. Priestnall, J. Pilling, F. Brown. *Hon. Treasurer*—T. Cosier. *Hon. Secretary*—J. Newburn, 5 Beach Terrace, Widnes.

Wigan Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Quadrant Café, Rodney Street, Wigan. *President*—R. Wardman. *Vice-Presidents*—Rev. J. S. Barnes, G. R. Newman, S. Richardson. *Council*—J. H. Atherton, B. B. Hartley, John Smith, H. S. Hill, P. Clark, W. E. Boyce, G. M. Marin. *Secretary and Treasurer* — Frederick Betley, 10 Springfield Street, Wigan.

Windsor Amateur Photographic Research Camera Club.—(ESTABLISHED 1893.)—Meetings held at Montpelier House, or on invitation of some of the members. *President*—James Collins. *Vice-Presidents*—Sir David Taylor, J.P., and James Henderson, M.A., J.P. *Committee*—Sidney Greer, Joseph McConnell, John Thompson. *Treasurer*—Robert B. Gardner. *Secretary*—William James Gibson, Montpelier House, Belfast.

Wolverhampton Photographic Society.—(ESTABLISHED 1888.)—Meetings held at the Blind Institute, Victoria Street, Wolverhampton. *President*—J. M. Taylor. *Vice-President*—H. E. Perry. *Committee*—T. H. Cox, Dr. F. Dally, R. W. Deans, O. T. Hayward, H. Holcroft, W. G. Orme, F. White, F. H. Whitehouse. *Treasurer*—F. J. Gibson. *Secretary*—G. Hanmer, 2 Dudley Road, Wolverhampton.

Woolwich Photographic Society.—(ESTABLISHED 1892.)—Affiliated to the Royal Photographic Society. Meetings held at St. John's Schools, Wellington Street, Woolwich. *President*—W. H. Dawson. *Vice-Presidents*—Colonel C. D. Davies, H. H. Barker, C. Churchill. *Council*—W. E. Champion, J. Cregan, J. Desforges, W. R. Dunger, James Hope, H. J. Spencer, G. Tapp. *Secretary and Treasurer*—Frederick W. Machen, 161 Griffin Road, Plumstead, S.E.

Morgan & Kidd
Richmond

Woodford Photographic Society.—(ESTABLISHED 1893.)—Meetings are held at the Coffee Tavern, George Lane, South Woodford. *President*—E. B. WINCaird. *Council*—Messrs. Goodwin, Malby, and Smith. *Secretary and Treasurer*—F. E. Emler, 1 Florence Villas, Chelmsford Road, Woodford.

Worcestershire Photographic Survey Society.—(ESTABLISHED 1896.)—Meetings held at the Victoria Institute, Worcester. *President*—J. W. Willis Bund *Vice-Presidents*—Lord Cobham, the Hon. A Percy Allsopp, Michael Tomkinson, George E. Abell, John Corbett, Frederick Corbett. *Council*—J. W. Willis Bund, F. Corbett, Ernest Day, W. A. Firkins, S. G. N. Spofforth, T. Duckworth, R. H. Murray, F. Ronald Jeffrey, C. R. Sayer, T. J. Hobson, Rev. W. M. Kingsmill, Rev. E. N. Dew, Captain Sherwell, F. E. Hill, J. B. Judson, J. Cane, W. L. Frost, J. F. Santonna, S. Hill, T. James, J. Page Croft. *Hon. Members*—W. A. Firkins and Alderman Ernest Day. *Hon. Auditor*—T. James. *Hon. Secretary and Treasurer*—S. G. Norcliffe Spofforth, 10 Pierpoint Street, Worcester.

Worcester Tricycle Club (Camera Section).—(ESTABLISHED 1892.)—Meetings held at the Bell Hotel, Worcester. *President*—J. Wilkes. *Committee*—J. Cam, W. Cam, S. Hill, T. James, J. F. Santonna. *Treasurer*—F. E. Hill. *Secretary*—T. J. Hobson, 15 Albany Terrace, Worcester.

Wycombe Camera Club.—(ESTABLISHED 1892.)—Meetings held at the South Bucks Auction Mart, Wycombe. *President*—W. Howland. *Committee*—Messrs. Broughton, Turner, Norton, Sherriff, Burton, Fox. *Secretary and Treasurer*—J. Wilford, 7 High Street, High Wycombe.

Yeadon and District Photographic Society.—(ESTABLISHED 1896.)—Meetings held at the Town Hall, Yeadon. *President*—E. E. Slater. *Vice-Presidents*—H. E. Illingworth and B. Town. *Committee*—R. P. Jibson, T. A. Womersley, T. Lumb, T. Wormald, R. L. Hardcastle. *Secretary and Treasurer*—E. Lamb, Moorfield Terrace, Yeadon, near Leeds.

Y.M.C.A. Camera Club.—(ESTABLISHED 1894.)—Meetings are held at the Y.M.C.A. Rooms, Friar Street, Reading. *Secretary*—J. W. Kent, 131 Friar Street, Reading.

York Photographic Society.—(ESTABLISHED 1887.)—Meetings are held at the Victoria Hall, York. *President*—Thomas Brown. *Vice-President*—Thomas Hunter. *Council*—R. Redpath, G. F. Dawson, J. Dickinson, F. Shroeder. *Treasurer*—R Bainbridge. *Secretary*—Frederic G. P. Benson, 50 Scott Street, York.

Yorkshire Philosophical Society (Photographic Section).—(ESTABLISHED 1888.) — Meetings are held on first Wednesday at the Museum. York. *President*—Tempest Anderson, M.D., J.P., B.Sc. *Vice-Presidents*—William Monkhouse and John Kitching. *Committee*—A. Tempest, Malcolm Spence, George Baker, B. Wales. *Secretary and Treasurer*—H. Dennis Taylor, F.R.A.S., Trenfield, Holgate, York.

Ceramic-Enamels
as Miniatures or for Jewellery

COLONIAL PHOTOGRAPHIC SOCIETIES.

Amateur Photographic Association of Victoria, Melbourne.—(ESTABLISHED 1883.)—Meets monthly on the second Tuesday in each month, Informal Meetings on the fourth Monday in the month, at the Royal Society's Hall, Victoria Street, Melbourne. *President*—Dr. Kaufmann. *Hon. Secretary*—J. H. Harvey.

Amateur Photographic Society of Madras.—(ESTABLISHED 1888.)—Meetings held at the Masonic Hall, Madras. *Patrons*—H.E. Sir Arthur Elibank Havelock, G.C.M.G., G.C.I.E., and the Hon. the Maharajah of Vizianagram, G.C.I.E. *President*—C. Michie Smith, B.Sc. *Vice-Presidents*—W. A. Willock, I.C.S., and Surgeon-Major J. L. Van Geyzel. *Committee*—Mrs. McNair, R. Ll. Jones, A. E. Lawson, W. H. Oakes, C. E. Phipps, E. W. Stoney. *Treasurer*—V. G. Lynn. *Secretary*—S. Jackson, F.I.C., c/o Messrs. Binny & Co., Madras.

Auckland Photographic Club, New Zealand.—General Meetings, the second and fourth Thursday of each month. Annual Meeting in October. Club Rooms, Australian Mutual Provident Society's Buildings, Queen Street, Auckland. *Hon. Secretary*—G. R. Boulton.

Ballarat Photographic Club, Ballarat, Victoria.—Meetings are held on the fourth Wednesday in each month in the School of Mines, Ballarat. *Hon. Secretary*—Frederick D. Martell.

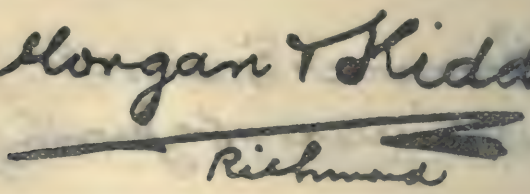
Barossa Camera Club, Nuriootpa, South Australia.—*Hon. Secretary*—Walter J. Ponder.

Bendigo Amateur Photographic Society.—Meetings held at the School of Mines. *President*—J. W. Faul. *Hon. Secretary*—F. Napoli Prescott.

Canterbury Philosophical Institute (Photographic Section), Christchurch, New Zealand.—Meetings held on second Tuesday in each month. *Hon. Secretaries*—S. Page and R. C. Bishop.

Cape Town Photographic Club.—(ESTABLISHED 1890.)—Meetings are held at the Y.M.C.A. Hall, Cape Town. *President*—David Gill, LL.D., F.R.S., &c. *Vice-President*—Professor W. S. Loyeman. *Council*—D. C. Andrew T. W. Cairncross, J. P. Edwards, A. Gracie, R. T. Pett, E. J. Steer, J. R. Wignall, C. Ray Woods. *Secretary and Treasurer*—Andrew James Fuller, 37 Grave Street.

Central Queensland Amateur Photographic Club, Rockhampton.—*Hon. Secretary*—H. V. Sankey.



Dunedin Photographic Society, Dunedin, New Zealand.—Meetings held every Wednesday in Club Rooms, Liverpool Street. *Hon. Secretary*—P. Helmore.

Foochow Camera Club.—(ESTABLISHED 1892.)—Meetings held at the Club Rooms. *President*—G. Siemssen. *Vice-President*—F. J. Rentzsch. *Hon. Treasurer*—H. W. Churchill. *Hon. Secretary*—J. Mencarini, Foochow, China.

Gordon College Amateur Photographic Association.—(ESTABLISHED 1889.)—Meetings held on each Friday in the month at Gordon College, Geelong, Victoria. *President*—H. G. Roebuck. *Vice-Presidents*—S. R. J. Mawson and J. H. McPhillimy. *Committee*—A. E. Bratley, G. Brinsmead, C. O. Dentry, J. B. Leitch, A. Purnell. *Treasurer*—R. Collins Hocking. *Hon. Secretary*—John Hammerton, jun., 73 Little Ryrie Street, Geelong, Victoria.

Hamilton Association Camera Club.—(ESTABLISHED 1892.)—Headquarters, Museum, Main Street, West. Annual meeting, April. Meetings, last Tuesday of each month. *Secretary and Treasurer*—Wm. White, 9 James Street, North, Hamilton, Ontario, Canada.

Hawke's Bay Camera Club, Napier, New Zealand.—*Secretary*—W. Beswick, Post Office, Napier.

Ipswich and West Moreton Amateur Photographic Society, Ipswich, Queensland—(ESTABLISHED 1893.)—Meetings on the second Wednesday of each month. *Hon. Secretary*—E. Bostock, Brisbane Street, Ipswich, Queensland, Australia.

Kimberley Camera Club.—(ESTABLISHED 1890.)—Meetings held at the Club Rooms. *President*—James Lawrence, M.L.A. *Chairman*—Montague Thane. *Vice-Chairman*—F. H. Hancox. *Council*—J. Childs, E. Goffe, L. Atkinson. *Secretary and Treasurer*—Charles Howie, P.O. Box 233, Kimberley, S.A.

Melbourne Working Men's College Photographic Society, Melbourne, Victoria.—Meetings held on the first Tuesday in each month at Latrobe Street. *President*—Professor Kernot. *Hon. Secretary*—Mr. Relph.

Montreal Camera Club.—(ESTABLISHED 1890. INCORPORATED 1892.)—Place of Meeting, 4 Phillips Square, Montreal. Annual Meeting, first Tuesday in May. Regular Meetings, first and third Tuesdays from October to May inclusive. *President*—Edward Stanger. *Vice-President*—A. J. Ferguson. *Committee*—George Sumner, Howard T. Barnes, Frank R. Redpath, Charles Lester, George McDougall, Nevill Norton Evans. *Treasurer*—A. Clarence Lyman. *Secretary*—Alfred W. Cole, 28 Victoria Street, Montreal, Canada.

Nelson Camera Club, Nelson, New Zealand.—Meetings are held on the third Friday of each month at the Club Rooms, Hartley Street. *Hon. Secretary*—H. Brusewitz.

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Northern Tasmania Camera Club, Launceston.—(ESTABLISHED 1889.)—Meetings held on the third Wednesday of each month. *Hon. President*—W. H. Twelvetrees. *Vice-Presidents*—P. C. Maxwell, J. Sparrow, Charles Hart. *Committee*—R. Lewis Parker, F. C. Birchall, J. A. Larner. *Hon. Secretary and Treasurer*—F. Styant Browne, 112 Brisbane Street, Launceston.

N.S.W. Lands Department Photographic Society, Sydney.—Meetings held on the last Thursday in each month. *Chairman*—J. R. Yorke. *Committee*—O. W. Ballhausen, E. T. Davis, M. V. Murphy, H. P. Rich, R. W. Vale. *Hon. Secretary and Treasurer*—William Hamilton, Lands Department, Sydney.

N.S.W. Railway and Tramway Camera Club, Sydney.—Meetings held on the first Monday in each month. *Hon. Secretary*—J. Scoular.

Perak Amateur Photographic Society.—(ESTABLISHED 1895.)—Meetings are held in the Society Room every first Wednesday of the month. *President*—L. Wray, jun., F.Z.S., M.I.E.E. *Committee*—M. J. Wright, M.B., C.M., R. O. N. Anderson, A.M.I.C.E., F. Duberly, W. van Dart. *Hon. Secretary*—George Bain.

Photographic Association of Canada.—(ESTABLISHED 1883.)—Place of Meeting, London, Ontario, Canada. *President*—H. S. Park (Toronto). *First Vice-President*—J. Frank Jackson (Barrie). *Second Vice-President*—W. Still (Orangeville). *Treasurer*—J. T. Ramsay (Toronto). *Secretary*—Thomas D. Hastings, c/o Frank Cooper, London, Ontario, Canada.

Photographic Society of India.—(ESTABLISHED 1888.)—Meetings are held at 57 Park Street, Calcutta. *Patron*—His Excellency the Earl of Elgin. *Patroness*—Lady Mackenzie. *President*—P. Donaldson. *Vice-Presidents*—N. Giannacopulo and T. A. Pope. *Committee*—Arthur Caspersz, W. R. Donogh, T. C. Downing, E. B. Havell, A. Thomson, E. M. Showers, Maharaj Kumar P. K. Tagore, A. Tocher, T. H. Wilson. *Hon. Treasurer*—T. N. Maniachi. *Hon. Secretary*—H. N. Harris, 57 Park Street, Calcutta.

Photographic Society of Japan.—(ESTABLISHED 1889.)—*President*—Viscount Enomoto, Minister of Education for Japan. *Vice-Presidents*—Professor D. Kikuchi, M.A. (Cantab.), Dr. W. S. Bigelow, Kajima Seibei, Dr. E. Baelz. *Treasurer*—Y. Ishizu. *Secretaries*—Professor H. Ishikawa and Professor W. K. Burton.

Photographic Society of New South Wales, Sydney.—Meetings held every Tuesday at the Society's Room, Hamilton Street. *Hon. Secretary*—E. T. Davis, Box 829, G.P.O.

Photographic Union of New South Wales, Sydney.—Meetings held on the first Thursday of each month. *Hon. Secretary*—Charles H. Kerry.

Queensland Amateur Photographic Society, Brisbane.—(ESTABLISHED 1887.)—Meetings are held on the fifteenth of each month at *Courier* Buildings, Brisbane. *Hon. Secretary*—J. F. Campbell.

Singapore Amateur Photographic Society.—Meetings are held at 53 Hill Street, Singapore. *President*—E. J. Nanson. *Committee*—A. W. Bean and G. Brinkworth. *Treasurer*—F. M. Elliot. *Secretary*—E. F. Gros, Singapore.

Southland Camera Club, Invercargil, New Zealand.—Meetings held on the third Monday in each month. *Hon. Secretary*—A. M. Macdonald, Esk Stores.

St. John Camera Club.—(ESTABLISHED 1893.)—Meetings held at 65 William Street, St. John, New Brunswick. *Secretary*—J. Kaye-Allison, P.O. Box 401, St. John, N.B. Canada.

South Australian Photographic Society.—(ESTABLISHED 1885.)—Meetings held at the Chamber of Manufactures, North Terrace, Adelaide. *Patrons* Hon. Sir E. T. Smith, K.C.M.G., M.L.C., Sir Charles Todd, K.C.M.G., Hon. Dr. J. A. Cockburn, M.P., Professor E. H. Rennie, M.A., D.Sc., Professor W. H. Bragg, M.A., J. J. Green. *Past Presidents*—S. J. Dailey, C. F. Clough, G. Stace, E. W. Belcher. *President*—A. W. Dobbie. *Vice-Presidents*—C. L. Whitham and R. F. Griffiths. *Committee*—The Executive Officers, A. W. Marshall, A. H. Kingsborough, C. E. Kerr. *Auditors*—C. Radcliffe and J. D. Dixon. *Hon. Librarian and Assistant Secretary*—G. Hassell. *Hon. Treasurer*—S. P. Bond. *Hon. Secretary*—J. Gazard, Mutual Chambers, 111 King William Street.

Toronto Camera Club.—(ESTABLISHED 1885, INCORPORATED 1893.)—Place of Meeting, the Forum Building, corner of Yonge and Gerrard Streets, Toronto, Ontario, Canada. *President*—Edmund E. King, M.D. *First Vice-President*—W. B. Varley. *Second Vice-President*—F. D. Manchee. *Committee*—E. M. Lake, W. H. Moss, Hugh Neilson, J. G. Ramsey, T. D. Bailey, H. M. R. Glover. *Secretary and Treasurer*—John J. Woolnough, 94 McPherson Avenue, Toronto, Ontario, Canada.

Upper Canada College Camera Club.—(ESTABLISHED 1891.)—Meetings are held at Upper Canada College, Toronto, Ontario, Canada. *Secretary*—O. M. Biggar, 249 Simcoe Street, Toronto, Ontario, Canada.

Wanganui Camera Club, New Zealand.—*President*—A. Elliott. *Hon. Secretary*—D. Meldrum.

Wellington Camera Club, New Zealand.—(ESTABLISHED 1892.)—Meetings are held on the second Friday in each month in the Fine Art Gallery, Whitmore Street. *Hon. Secretary*—F. J. Denton, 33 Willis Street.

West Australian Photographic Society, Perth.—(ESTABLISHED 1894.)—Meetings held on the third Wednesday in each month. Annual meeting in September. *Hon. Secretary*—A. R. L. Wright, Public Works Department, Perth.

Westland Camera Club, Hokitika, New Zealand.—*President*—James Park. *Hon. Secretary*—James King.

CONTINENTAL PHOTOGRAPHIC SOCIETIES.

AMATEUR FOTOGRAFEN-VEREENIGING TE AMSTERDAM. Established September 1, 1887. Headquarters and Studio, Handboogstraat 2. Meetings, Wednesday, fortnightly. Ign. Bispinck, President. W. H. de Witt, Librarian. J. P. Goedkoop, Commissary. A. W. de Flines, Treasurer. D. Wilmerink, Handboogstraat 2, Secretary.

ASSOCIATION BELGE DE PHOTOGRAPHIE.—Established May 17, 1874. Meetings are held at the Palais du Midi, Bruxelles. Seven Sections: Brussels, Antwerp, Ghent, Courtrai, Louvain. Liège, Namur. S.A.R. Monseigneur le Prince Albert de Belgique, Hon. President. Jos. Casier, President. Jos. Maes and Massange de Louvrex, Vice-Presidents. — Canfyn, A. de Gryse, B. de Vaux, E. Jossart, Alb. Lunden, A. Nyst, E. Orban-Viot, H. Peltzer, Ch. Puttemans, A. Rutot, J. Savoné, V. Selb, and — Stappers, Committee. A. Nyst, Treasurer. Marcel Vanderkindere, 97 Avenue Brugmann, Uccle lez-Bruxelles, Secretary.

ASSOCIATION NATIONALE DES PHOTOGRAPHES AMATEURS.—Fondée le 15 Mars, 1894, et autorisée par arrêté préfectoral du 22 Décembre, 1894. Place of Meeting, au domicile du Président, actuellement à Châteaugiron (Ille-et-Vilaine). Alfred Savary, President. M. Jousseaume, Vice-President. MM. Cosnard, Le Sage de la Have, Marnelle, and Le Millier, Committee. Roul de la Hellière, au Château de Châteaugiron (Ille-et-Vilaine), Secretary and Treasurer.

DANSK FOTOGRAFISK FORENING.—Established April 5, 1879. Place of Meeting, Copenhagen. F. C. L. Weller, President. P. Fristrup, Vice-President. C. U. Bauer, Treasurer. P. Schaumburg, Nörrebrogade 12, Copenhagen N., Secretary.

DEUTSCHE GESELLSCHAFT VON FREUNDEN DER PHOTOGRAPHIE IN BERLIN.—Meldungen zum Beitritt für die Deutsche Gesellschaft von Freunden der Photographie nehmen die Mitglieder des Vorstandes entgegen und versenden dieselben auf Wunsch die 'Satzungen' der Gesellschaft. Näheres durch den Schriftführen Herrn Direktor Schultz-Hencke, Lette-Institut, Berlin S.W., Königgrätzer-strasse 90. Der Jahresbeitrag beträgt M.20,00. für Auswärtige jährlich M.14.

DEUTSCHER PHOTOGRAPHEN VEREIN.—Established December 29, 1876. Place of Meeting, Weimar, every year in August. K. Schwier, President. Karl Wunder, Vice-President. George Alpers, jun., F. Dyck, and Ernst Sonntag, Committee. K. Schwier, Treasurer. C. Kesselhuth, Hildesheim, and K. Schwier, Weimar, Secretaries.

FACHVEREIN DER PHOTOGRAPHEN ZU BERLIN.—Established December 1, 1893. Place of Meeting, Berlin, S. 14, Neue Ross-str., 3. Israr Brettschneider, President. Paul Tarksteit, Vice-President. Eduard Günther, Treasurer. R. Obizh and Eduard Günther, N.W. Lessingstrasse, 13, Secretaries.

GRÖNINGER AMATEUR PHOTOGRAPHEN VEREENIGING 'DAGUERRE.'—Established 1891. Meetings held at the Hotel Willems. R. Roelfsema, President. H. W. Freseman Vietar, Vice-President. C. A. M. van Riet, Treasurer. Thr. C. T. Quintus, Oosterstraat Groningen, Secretary.

HAARLEMSCHE AMATEUR FOTOGRAFEN CLUB.—Established 1891. Place of Meeting, Haarlem Societeit Vereeniging. F. J. M. Huijsser, President. C. G. H. Bakker, Treasurer. Maurits H. Binger, Zylweg, 55, Haarlem, Secretary.

LE PHOTO VELO CLUB DE PARIS.—M. Violette, 21 Boulevard St. Germain, Paris, France, Secretary.

MÜNCHENER PHOTOGRAPHISCHE GESELLSCHAFT.—Established 1879. Place of Meeting, München. Adalbert Werner, President. Otto Wernhard, Treasurer. E. Kieser, Secretary. Address of Society, Deutsches Haus, Carlsplatz, München.

NEDERLANDSCHE VEREENIGING VAN DILETTANT PHOTOGRAPHEN 'HELIOS.'—Established, 1872. Meetings held at the Photographic Studio and Club Rooms of the Society, Spui, Amsterdam. J. Praetorius, President. J. J. Uytwerf Sterling, Joh. Ruys, F. W. Oewel, Committee. G. van der Aa, Treasurer. W. K. W. Matthes, Willemsparkweg 35, Amsterdam, Secretary.

Continental Photographic Societies—*Continued.*

Photographische Gesellschaft, Hamburg, Altona.—Established November 4th, 1873. G. Wolf, Hamburg, President. Th. Petersen, St. Pauli, Vice-President. Herm. Boock, C. W. Lüders, Kunstschleifer, Committee. W. Köhnen, Altona, Treasurer. H. Boock, Bergstrasse, 26. Meets first Tuesday in the month, at 8 p.m., at Gerhafstrasse, 10, Hamburg.

Photographische Gesellschaft in Wien.—Established 1861. Place of Meeting, Palais der Akademie der Wissenschaft, Wien. Ottomar Volkmer, President. Dr. Carl Böhm von Böhmersheim, Vice-President. Carl Angerer, Wilhelm Burger, Josef Maria Eder, Michael Frankenstein, J. Löwy, Wilhelm Müller, Wilhelm Freiher von Schwarz-Senborn, Robert Sieger, Josef Ungar, and Louis Zwickl, Committee. Ludwig Schrank, Treasurer. Dr. Josef Székely, Secretary, Wien I. Elisabethstrasse, 2.

Photo-Club de Paris.—Established 1888. Place of Meeting, 44 Rue des Mathurins, Paris. Maurice Bucquet, President. E. Mathieu, Vice-President. M. Brémard, R. Demachy, P. Gers, M. Binder, C. Puyo, A. Darnis, and A. Toutain, Committee. H. Guérin, Treasurer. Paul Bourgeois, 44 Rue des Mathurins, Paris, Secretary.

Photographischer Verein zu Berlin.—Established 1863. Place of Meeting, Berlin, Architecten Vereinshaus. Paul Grundner, President. T. Reichard, Vice-President. T. C. Schaarwächter, Dr. S. Steinschneider, Paul Schückert, Hpsm. u. Dr. Himly, Dr. A. Miethe, Dr. A. Hesekiel, and F. Cornand, Committee. E. Martini, Treasurer. Director Schultz-Hencke, Berlin, S.W. Königgratzerstrasse, P.V., Secretary.

Société Française de Photographie.—Established 1854. Place of Meeting, 76 Rue des Petits-Champs, Paris. M. Lippmann, President. M. Davanne, Vice-President. MM. Davanne (President), Le Général Sebert and Bardy (Vice-Présidents), Perrot de Chaumeux (Secrétaire Général), Pector and Londe (Secrétaires Généraux adjoints), Audra (Trésorier), Bordet (Bibliothécaire), Gauthier Villars, Gobert, Rolland, De Saint-Senoch, Thouronde, and De Villecholle, Council. MM. Aimé Girard and Gauthier Villars, père, Hon. Members. M. Audra, Treasurer. M. Perrot de Chaumeux, 1 Rue Malleville, Enghien-les-Bains (S. & O.), Secretary.

Société Genevoise de Photographie.—Established 1882. Meetings held at the Society's Rooms, 1 Grand Mézel. Dr. E. Batault, President. MM. Lacombe and Mazel, Vice-Presidents. J. A. Bouvier, Librarian. L. Jaquerod, Treasurer. MM. John Bosson, Rue Thalberg, 4, and Blachier, Tranchées de Rive, 11, Secretaries.

Société Nantaise de Photographie.—Established 1881. M. du Hanlay, Lieut.-Colonel, President. M. Toublanc, Vice-President. Ch. Planté, H. Bureau, P. du Mineby, Committee. M. Tassain, Treasurer. Paul Crémant, Rue d'Alger, 13, Nantes, Secretary, and Pierre Courant, Assistant Secretary. Réunion le premier vendredi de chaque mois, au Cercle des Beaux-Arts.

Société Photographique Professionnelle.—Established 1878. Place of Meeting, Place St. Gervais, 6, à Genève. E. Dovaz, President. Charles Racine, Vice-President. Louis Barral, Treasurer. Antoine Chevalley, Siège de la Société, Secretary.

Société Versaillaise de Photographie.—Established 1884. Séances de la Société les premiers Mardis de chaque mois à la Mairie à 8 heures et demie du soir. Maurice Bucquet, President. L. Ottenheim, Vice-President. Comité d'administration, Committee. M. Gavin, Treasurer. Jessé Curely, 20 Rue de Provence, Versailles, Secretary.

Verein zur Förderung der Photographie.—Established 1869. Professor O. Raschdorff, President. Professor Dr. H. W. Vogel, Ehren-President. Dr. E. Vogel, H. Haberlandt, W. Dieskau, E. Fuchs, A. Herzheim, P. Loescher, H. Schmidt, F. Standigl, and Dr. Stockmer, Committee. Gustav Schmidt, Treasurer. Paul Hanncke, Berlin, W., Bülowstrasse, 99, Secretary.

Verein zur Pflege der Photographie und verwandter Künste, Frankfurt a. Main.—Established 1875. Docent am der technischen Hochschule, F. Schmidt, President. H. Maas, Vice-President. T. H. Voigt, C. Ruf, W. Pöllot, Dr. C. Kleinschmidt, and J. E. Rumpel, Committee. C. Böttscher, Treasurer. Dr. A. Shebel, Protocoll Secretary. Th. Haake, Frankfurt a. Main, Correspondenz Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES.

Agassiz Association, Manhattan Chapter (Photographic Section), New York.—Established 1881. Meetings held at 141 East Fortieth Street, New York City. C. F. Groth, President. C. Kromm, Vice-President. C. F. Groth, R. Kitchelt, E. B. Miller, W. S. Miller, H. T. Rowley, H. Brennich, F. C. Fruhan, Miss M. Leeson, and Miss M. Hargrove, Committee. W. S. Miller, Treasurer. E. B. Miller, 141 East Fortieth Street, New York City, Corresponding Secretary.

Akron Camera Club.—Meetings are held at residences of members on the second Tuesday of each month. Edward A. Terrass, President. Henry Canfield, Vice-President. Frank Adams, Treasurer. Margaret Mitchell, 150 South Summit Street, Akron, Ohio, U.S.A., Secretary.

Albany Camera Club.—Organized October 21, 1887. Meetings held at the Club House, 72 Chapel Street, Albany, N.Y. W. W. Byington, President. Dr. L. H. Neuman, Vice-President. Dr. S. B. Ward, Prof. Maurice Perkins, John S. Paterson, Geroge H. Russell, C. W. Reynolds, Dr. Frank W. Cady, Dr. C. S. Moore, and L. H. Stewart, Directors. Edward D. Mix, Treasurer. Charles B. Tillinghast, 72 Chapel Street, Albany, N.Y., Secretary.

Amateur Photographic Association (Selma, Alabama).—Established Dec. 29, 1887. Meetings held at 916 Broad Street, Selma, Alabama. William S. Monk, President. S. A. Sexton and Miss Mary E. Keipp, Committee. S. Orlando Trippe, Selma, Dallas County, Alabama, Secretary and Treasurer.

American Institute (Photographical Section.)—Established 1859. Regular Meetings are held on the first Tuesday in each month, at Eight p.m., except July, August, and September, at 111, 113, 115 West Thirty-eighth Street, New York City. Oscar G. Mason, President. R. A. B. Dayton, Vice-President. Committee on Chemistry and Optics, Committee. William H. Oakley, Treasurer. Dr. John W. Bartlett, 149 West Ninety-fourth Street, New York City, Secretary.

American Lantern Slide Interchange.—Established 1885. Incorporated 1893. Meetings held at 361 Broadway, New York, on November 15 of each year. F. C. Beach, W. H. Rau, William H. Olmsted, W. H. Cheney, and John S. Paterson, Board of Managers. F. C. Beach, 361 Broadway, New York, General Manager and Secretary. William H. Olmstead, Syracuse, N.Y., and W. H. Rau, Philadelphia, Pa., Assistant Managers.

Bethlehem Photographic Society.—Established January, 1894. Meetings held at Bethlehem, Pa., U.S.A. Professor E. M. Hyde, President. Professor H. S. Housekeeper, Vice-President. C. S. Smith, Treasurer. F. E. Hausmann, Bethlehem, Pa., U.S.A, Secretary.

Boston Camera Club.—Established 1881. Meetings held at the Club Rooms, 50 Bromfield Street, Boston, Mass. Joseph Prince Loud, President. William O. Witherell, Francis H. Manning, and Charles H. Currier, Vice-Presidents. Joseph Prince Loud, William O. Witherell, Francis H. Manning, Charles H. Currier, Charles Hall Perry, Charles H. Chandler, F. Alcott Pratt, Edward R. Andrews, Charles Sprague, Rufus A. Bullock, Horace Packard, Thomas J. Babcock, and Fred S. Harlow, Executive Committee. Charles H. Chandler, Treasurer. Charles Hall Perry, 50 Bromfield Street, Boston, Mass., U.S.A., Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—*Continued.*

Bridgeton Camera Society.—Established January, 1890. Incorporated March, 1893. Meetings held at 48–50 East Commerce Street, Bridgeton, N.J. Henry A. Janvier, President. George Hampton, Vice-President. Hugh L. Reeves, Howard W. Fithion, and Sydney E. Bower, Managing Committee. Sydney E. Bower, Treasurer. Henry W. Scull, Cumberland National Bank, Bridgeton, N.J., Secretary.

Brooklyn Institute of Arts and Sciences (Department of Photography).—Established 1887. Meetings held at 201 Montague Street. J. Frederick Hopkins, President. Myers R. Jones and George W. Wundram, Vice-Presidents. J. Frederick Hopkins, George W. Wundram, Professor William C. Peckham, William J. Bryant, Myers R. Jones, Henry L. Underhill, Mrs. C. H. Burdett, James W. Kent, L. D. Martens, Frank A. Perret, and James H. Ferguson, Executive Committee. L. D. Martens, Treasurer. W. J. Bryant, Box 53, Brooklyn, New York, U.S.A., Secretary.

Brooklyn (N.Y.) Academy of Photography.—Incorporated in February, 1887. Meetings held at 177 Montague Street, Brooklyn, New York, U.S.A. H. B. Fullerton, President. Samuel Baron and F. M. Lawrence, Vice-Presidents. Dr. John Merritt, Frank La Manna, William B. Dudley, A. R. Pardington, and Starks W. Lewis, Committee. A. F. Ormsbee, Curator and Librarian. William T. Wintringham, Treasurer. William Arnold, 177 Montague Street, Brooklyn, New York, U.S.A., Secretary.

Buffalo (N.Y.) Camera Club.—Established October 10, 1888. Meetings are held at Market Arcade, Main Street, Buffalo, N.Y. John A. Stein, President. Conrad L. Baer, Vice-President. John P. Zenner, 932 Genesee Street, Buffalo, N.Y., U.S.A., Secretary and Treasurer.

California Camera Club.—Incorporated April 5, 1890. Meetings held at 819 Market Street, San Francisco, California. W. B. Webster, President. W. E. Goodrum and E. W. Jensen, Vice-Presidents. C. A. Lee, J. J. B. Argenti, C. F. Cormack, E. J. Dollard, and P. Maunder, Directors. E. G. Eisen, Treasurer. H. B. Hosmer, 819 Market Street, San Francisco, California, U.S.A., Secretary. A. L. Coombs, 819 Market Street, San Francisco, California, U.S.A., Corresponding Secretary.

Camera Club, New York.—Established 1884. Meetings held at 111–113 West Thirty-eighth Street, New York City. William D. Murphy, President. Alfred Stieglitz, Vice-President. Louis B. Schram, William Bunker, William R. Thomas, John Beeby, James T. Vredenburgh, Committe. Frank M. Hale, Treasurer. Harry B. Reid, 111 West Thirty-eighth Street, New York City, Secretary.

Camera Club of Mount Vernon.—Established 1895. Meetings are held at Studio of W. F. Slaight, Fourth Avenue, Mount Vernon, New York, U.S.A. Miss Mary E. Jennings, Secretary.

Camera Club of the Capital Bicycle Club.—Established 1891. Meetings held at 409 Fifteenth Street, Washington, D.C., U.S.A. Charles Richards Dodge, President. E. Lee Ferguson, 1338 West Street, N.W., Washington, D.C., Secretary and Treasurer.

Camera Club of the University of Nebraska.—Established 1892. Meetings held at the Chemical Laboratory of the University of Nebraska, corner of Twelfth and R Streets, Lincoln, Neb., U.S.A. Miss Adaline Quaintance, P. O. Box 675, Lincoln, Neb., U.S.A., Secretary and Treasurer.

American Photographic Societies—*Continued.*

Camera Club of the University of Pennsylvania.—Established 1889. Meetings held at the College Hall, University of Pennsylvania, Thirty-sixth Street and Woodland Avenue, Philadelphia, Pa. Chas. R. Hinchman, 3655 Chestnut Street, Philadelphia, Pa., U.S.A., Secretary.

Camerads of New Brunswick, N.J.—Established 1882. Meetings held in Rutger's College. Peter T. Austin, Ph.D., President. William D. Horn, Vice-President. George Parsell, J. Arthur Blish, and Frederick Ulrich, Council. Charles V. Myers, Treasurer. Dr. Harvey Iredell, Lock Box 34, New Brunswick, N.J., U.S.A., Secretary.

Central Camera Club, Brooklyn Y.M.C.A.—Established June 1, 1888. Meetings held at 502 Fulton Street, Brooklyn, N.Y. William H. Lowery, President. James P. Allen, Vice-President. J. G. McTaggart, Treasurer. Edward L. Damon, 322 Livingston Street, Brooklyn, N.Y., U.S.A., Secretary.

Chautauqua Photographic Exchange Club.—Established 1888. C. M. Fitzgerald (Georgetown, California), President. Miss C. L. Pierce, Elmhurst, Riverside, Conn., U.S.A., Secretary and Treasurer.

Chicago Camera Club.—Established 1888. Meetings are held at 184 Wabash Avenue on the second Tuesday of each month at Eight o'clock. Annual Meeting in April. Rooms always open and in charge of competent attendant. Members of other societies from all parts of the world always welcome, and dark rooms and studio (completely equipped) at their disposal. M. L. Williston, D.Sc., President. M. R. Brown, M.D., and Mrs. N. Gray Bartlett, Vice-Presidents. T. B. Patterson, Treasurer. W. W. Abbott, Secretary.

Chicago Society of Amateur Photographers.—Established 1886. Meetings held at Noonday Rest, 4 East Monroe Street. Walter A. Morse, President. Marshall Waite, Treasurer. F. F. Gayford, 597 Cleveland Avenue, Chicago, Ill., U.S.A., Secretary.

Cleveland (Ohio) Camera Club.—Established January 25, 1887. Meetings held at 5 Euclid Avenue on the first and third Tuesday evenings of each month at Eight p.m. The Annual Meeting is held on the first Tuesday evening in January, unless that Tuesday is the 1st of January, in which case it is deferred until the third Tuesday. William Ogler, President. Charles Potter, Vice-President. William Dorn, Treasurer. R. Dayton, M.D., 1202 Willson Avenue, Cleveland, Ohio, U.S.A., Secretary.

Colorado Camera Club Association.—Incorporated January, 1891. Meetings held at the Club Rooms, 329 Sixteenth Street, Denver, Col. W. H. Jackson, President. H. H. Buckwalter, Vice-President. W. H. Jackson, H. H. Buckwalter, A. D. Gilleland, H. D. Smith, S. C. McCurdy, J. P. Brockway, William Ferris, jun., Board of Directors. H. D. Smith, Treasurer. A. D. Gilleland, 329 Sixteenth Street, Denver, Col., U.S.A., Secretary.

Columbia Camera Club of Astoria.—Established 1893. Meetings are held at Engine Company's Hall on the second Wednesday of each month. W. Timson, 598 Commercial Street, Astoria, Ore., U.S.A., Secretary.

Columbia College (N. Y.) Amateur Photographic Society.—Established 1886. Meetings at Columbia College twice a month. Henry R. Taylor, President. Dwight Taylor, Treasurer. H. M. Brookfield, Secretary.

Columbian College (Washington, D.C.) Camera Club.—Established 1888. Ordinary Meetings at Columbian College, Washington, D.C., every Wednesday afternoon. Allan J. Houghton, President. Edwin W. Ashford, Vice-President. W. B. Asmussen, Librarian. A. J. Houghton, Treasurer. Charles P. Spooner, Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—*Continued.*

Columbia Photographic Society.—Organized December 7, 1889. Incorporated 1894. Meetings are held at 1507 Columbia Ave., Philadelphia, Pa., U.S.A. Dr. G. J. R. Miller, President. W. P. Buchanan, Vice-President. Dr. G. J. R. Miller, W. P. Buchanan, John N. Reeve, Benjamin L. Berry, H. E. Havens, Charles J. Cole, and Rudolph Pott, Board of Directors. John N. Reeve, 203 Walnut Place, Room 4, Philadelphia, Pa., Secretary and Treasurer.

Columbus (Ohio) Camera Club.—Established October 6, 1884. Rooms, Y.M.C.A. Building. Regular Meetings, third Thursday of each month except July and August at half-past Seven p.m. Annual Meeting, third Thursday of December. John Field, President. C. H. Doty, Vice-President. C. S. Bradley, Treasurer. W. B. Kimball, 32 East Spring Street, Columbus, Ohio, U.S.A., Secretary.

Cortland Camera Club.—Established 1895. Meetings held at Y.M.C.A. Rooms. L. M. Alexander, Lock Box 213, Cortland, N.Y., U.S.A., Secretary and Treasurer.

Daguerre Camera Club.—Established 1886. Meetings held at Oak Park, Illinois. F. D. Blish, President. Wells B. Sizer, Oak Park, Ill., Secretary and Treasurer.

Delaware Camera Club.—Established 1891. Headquarters in its Club Rooms in the Equitable Building, Wilmington, Delaware. Regular Meetings are held on the first Thursday of each month. John M. Rogers, President. Miss Rachel S. Howland and Geo. A. Elliott, Vice-Presidents. John C. Phillips, 803 Franklin Street, Wilmington, Del., U.S.A., Secretary.

Detroit Lantern Club.—Established January, 1891. Meetings held at the Museum of Art, Hastings Street and Jefferson Avenue, Detroit, Mich. Frank E. Kirby, President. A. D. Noble, jun., Director. D. Farrand Henry, 52 Woodward Avenue, Detroit, Mich., U.S.A., Secretary and Treasurer.

Elizabeth Camera Club.—Established 1893. Meetings held at 96 Broad Street. Jas. A. Knowles, President. A. P. Campbell, Vice-President. Dr. E. D. Frost, T. F. McCarty, J. G. Green, John Ball, E. W. Smith, A. P. Campbell, and A. N. Lakens, Committee. James A. Knowles, Treasurer. John Ball, 96 Broad Street, Elizabeth, N.J., U.S.A., Secretary.

Frankford Camera Club of Philadelphia.—Established October, 1888. Meetings are held at the Industrial and Beneficial Institute, Frankford, Philadelphia. J. Howard Morrison, President. Robert T. Taylor, Vice-President. B. Antrim Holdeman, J. B. Lomax, H. H. Sutcliffe, Miss M. C. Shallcross, Miss M. Rover, and, *ex officio*, the President and Secretary, Committee. H. H. Sutcliffe, Treasurer. John M. Justice, 5016 Penn Street, Frankford, Philadelphia, Pa., U.S.A., Secretary.

Hartford Scientific Society (Photographic Section).—Section Formed 1894. Meetings held at 25 Pratt Street, Hartford, Conn., U.S.A. Dr. G. L. Parmele, Chairman. A. S. Clark, Joseph Merrett, and Miss Grace Johnson, Committee. Louis W. H. Gradisky, 225 Capen Street, Hartford, Conn., U.S.A., Secretary and Treasurer.

Harvard Camera Club.—Established 1889. Headquarters, Harvard University, Cambridge, Mass. Annual meeting, June. Meetings monthly. Vernon Maunse, President. C. P. M. Rumford, Vice-President. Percy Emerson Brown, 11 Weld Hall, Cambridge, Mass., U.S.A., Secretary and Treasurer.

AMERICAN PHOTOGRAPHIC SOCIETIES—*Continued.*

Hoboken Camera Club.—Established March 22, 1889. The Regular Meetings of the Club take place the first Tuesday of each month. The Board of Governors meet the third Friday of each month. The Annual Meeting of the Club takes place the first Tuesday in March, when the election of officers takes place for the ensuing year. All Meetings are held at 1036 Park Avenue, Hoboken, N.J. A. J. Thomas, President. C. Sudhaus, Vice-President. Three Trustees (W. Schrader, A. Beyer, and E. E. Wooley), all the Officers of the Club, the House Committee (F. A. Muench), and the Entertainment Committee, Board of Governors. William Allen, Custodian. H. J. Kultenbach, Treasurer. A. L. Smith, 1045 Bloomfield Street, Hoboken, N.J., U.S.A., Secretary.

Irvington (N.J.) Art and Camera Club.—Established 1892. Meetings are held at Springfield and Union Avenues, Irvington, N.J., U.S.A. Edwin D. Harrison, President. F. H. Morrell, Vice-President. James Peckwell, jun., Treasurer. Melton Tompkins, Secretary.

Louisville Camera Club.—Established 1888. Meetings held at North-east corner of Fourth Avenue and Jefferson Street, Louisville, Ky. R. L. Stevens, 1100 West Main Street, Louisville, Ky., U.S.A., Secretary.

Lowell Camera Club.—Established January, 1889. Incorporated March, 1892. Meetings held at Central Block. Paul Butler, President. W. P. Atwood and F. T. Walsh, Vice-Presidents. Charles Runels, F. M. Goodhue, Fay H. Martin, and the Officers, Executive Committee. M. A. Taylor, Treasurer. George A. Nelson, 305 Summer Street, Lowell, Massachusetts, Secretary.

Lynn Camera Club.—Established January 1, 1888. Incorporated December 20, 1889. Regular Meetings, first Tuesday in each month. Annual Meeting, first Tuesday in January. All Meetings held at the Club House, 42 Broad Street. William H. Drew, President. J. N. Smith, Vice-President. W. H. Drew, J. N. Smith, J. W. Gibboney, A. J. Purinton, E. F. Bacheller, A. H. Carsley, W. B. Gifford, and W. A. Pevear, Committee. E. F. Bacheller, Treasurer. C. A. Lawrence, Club House, 42 Broad Street, Lynn, Mass., U.S.A., Secretary.

Mattapan Camera Club.—Established 1890. Meetings held at the private residence of Secretary, Brush Hill Road, Mattapan. John A. Locklin, President. Walter Hertzberg, Vice-President and Treasurer. Erdmann Sonnenbrodt, Box 83, Mattapan, Mass., Secretary.

Memphis Camera Club.—Established 1893. Meetings held at the Y.M.C.A. Buildings. S. J. Latta, President. A. Wardle, Vice-President. S. J. Latta, A. Wardle, Geo. O. Friedel, M. Stewart, E. I. Pinnel, Directors. Geo. O. Friedel, 165 Gayoso Street, Memphis, Tenn., U.S.A., Secretary and Treasurer.

Minneapolis Camera Club.—Incorporated 1892. W. B. Augir, President. W. H. McMullen, Vice-President. H. E. Murdock, J. S. Dodge, C. A. McCollorn, M.D., A. S. Williams, G. W. Beach, with the President, Vice-President, Treasurer, and Secretary, Board of Directors. G. A. Will, Treasurer. C. J. Hibbard, 17 South Fourth Street, Minneapolis, Minn., Secretary.

Mystic Camera Club.—Organized June 4, 1889. Incorporated March 17, 1891. Meetings held at 202 High Street, West Medford, Mass., U.S.A. Charles A. Smith, President. Warren M. Archibald, Vice-President. C. A. Smith, W. M. Archibald, C. A. Staniford, J. B. Thaxter, jun., J. F. Wade, B. D. B. Bourne, and E. B. Dennison, Executive Board. Joseph B. Thaxter, jun., Treasurer. Charles A. Staniford, 111 Cedar Street, Somerville, Mass., U.S.A., Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—*Continued.*

Newark (N.J.) Camera Club.—Established April 18, 1888. Meetings are held at the Club Rooms, 224 Market Street, Newark, N.J. William A. Halsey, President. William Archibald, Vice-President. H. W. Smith, William Archibald, Frank Olds, Miles Janson, Frederick Schuetz, D. S. Plumb, Henry Eberhardt, J. M. Foote, and Paul S. V. Thiery, Committee. J. M. Foote, Treasurer. D. S. Plumb, 24 Boudinot Street, Newark, N.J., U.S.A., Secretary.

New Britain Camera Club.—Established 1892. Headquarters, 210 Main Street. Annual meeting, January. Meetings, second and fourth Tuesdays in each month. E. F. Porter, President. G. A. Reckard. Vice-President. F. W. Wood, 273 Main Street, New Britain, Conn., U.S.A., Secretary and Treasurer.

New England Lantern Slide Exchange.—Established 1890. Will. C. Eddy, 88 Marshall Street, Medford, Mass., U.S.A., Secretary.

New Orleans Camera Club.—Established December 17, 1886. Meetings are held at 712 Union Street, New Orleans, La. Hon. Bernard C. Shields, President. W. Gowland, Vice-President. William Grimshaw, Treasurer. M. V. Haulard, 1729 Bienville Avenue, New Orleans, La., U.S.A., Secretary.

Newton Camera Club.—Established 1893. Meetings held at the Club House, Brookside Avenue, Newtonville, Mass., U.S.A. F. O. Stanley, President. E. E. Snyder, Vice-President. Austin S. Kilburn, West Newton, Mass., U.S.A., Secretary.

New York Camera Club.—Established 1888. Meetings are held at 314 Fifth Avenue, New York. Samuel W. Bridgham, President. Franklin Harper, Vice-President. Robert J. Devlin, Treasurer. Chas. W. Stevens, M.D., 33 West Thirty-third Street, New York City, U.S.A., Secretary.

Old Colony (Rockland, Mass.) Camera Club.—Established February 1 1890. Meetings held at Arnold Building, Liberty Street. David Smith, President. Emery H. Jenkins, Vice-President and Treasurer. David Smith, Rockland, Mass., U.S.A., Secretary.

Omaha Camera Club.—Established 1894. Meetings held at 1312 Farnam Street, Omaha, Neb. W. Durnall, 1312 Farnham Street, Omaha, Neb., U.S.A., Secretary.

Oneida Camera Club.—Established March 1, 1894. Meetings are held at the Club Rooms, Post-office Building, Oneida, N.Y. B. S. Teale, President. George R. Hanson, Vice-President. Jacob Standt, Wesley Fisher, and C. M. Kingsbury, Committee. Albert Dygert, Treasurer. C. R. Baker, P.O. Block, Oneida, N.Y., U.S.A., Secretary.

Orange (N.J.) Camera Club.—Organized March 21, 1892. Incorporated May 19, 1893. Meetings held at Decker Building, Main Street Orange, N.J. W. F. D. Crane, President. George A. Van Wagenen, M.D., Vice-President. W. H. Cheney, W. F. D. Crane, F. E. Gerbert, H. Joerns, G. E. Melendy, D. S. Plumb, T. J. Preston, jun., G. A. Van Wagenen, M.D., Executive Committee. D. S. Plumb, Treasurer. L. C. McDermott, East Orange, N.J., U.S.A., Secretary.

Oregon Camera Club.—Established January, 1895. Meetings are held at Room 715, Oregonian Building, Portland, Oregon. Edgar Felloes, President. W. H. Walker, Vice-President. Edgar Felloes, W. H. Walker, Milton P. Goldsmith, A. Anderson, Hugo B. Goldsmith, Executive Committee. A. Anderson, Treasurer. Milton P. Goldsmith, Room 314, Abington Building, Portland, Oregon, U.S.A. (Mail address, P.O. Box 93), Secretary.

American Photographic Societies—*Continued.*

Paterson Camera Club.—Established 1893. Meetings are held at 9 Lake Street. C. M. Giles, President. H. W. Gledhill, Vice-President. Wm. M. Moore, Treasurer. Chas. D. Cooke, Cooke Locomotive Works, Paterson, N.J., U.S.A., Secretary.

Photographers' Association of America.—Established 1880. Place of Meeting, Celoron, on Chautauqua Lake, State of New York. C. M. Hayes, President. J. Will. Kellmer and R. P. Bellsmith, Vice-Presidents. The Officers are the Executive Committee. George W. Varney, Treasurer. A. L. Bowersox, Dayton, Ohio, Secretary.

Photographers' Association of Iowa.—Established 1889. Meetings held at Des Moines, Iowa. G. S. Coman, President. E. S. Frey, First Vice-President. W. H. Jacobs, Second Vice-President. Theo. A. Brown, Treasurer. J. R. Hall, Monroe, Iowa, U.S.A., Secretary.

Photographers' Association of Missouri.—Established 1894. Meetings at Perth Springs, Mo., 1897. William Latour, President. O. L. Hutchins, First Vice-President. E. D. Fear, Second Vice-President. The President, Vice-Presidents, Secretary, and Treasurer, Executive Committee. Ellsworth Marks, Treasurer. A. S. Robertson, St. Louis, Mo., Secretary. Mr. Stone, Warrensburg, Mo., U.S.A., Assistant Secretary.

Photographers' Association of Ohio.—Office of Executive Committee, Hamilton, Ohio. A. L. Bowersox, President. George H. Barnum, Springfield, Ohio, U.S.A., Secretary.

Photographic Club of Baltimore City (Md.).—Established May, 1891. Meetings are held at Madison and Eutaw Streets, Baltimore City, Md. A. S. Murray, President. Dr. Frank Slothower, Vice-President. A. S. Murray, Dr. F. Slothower, A. J. Godby, F. W. McAllister, B. G. Buck, E. M. Barker, and Charles E. Needles, Board of Directors. E. M. Barker, Treasurer. Charles E. Needles, 404 Cathedral Street, Baltimore, Md., U.S.A., Secretary.

Photographic Society of Philadelphia.—Established 1862. Meetings held at 10 South Eighteenth Street, Philadelphia, Pa., U.S.A. Joseph H. Burroughs, President. Charles R. Pancoast and Robert S. Redfield, Vice-Presidents. Frank Bement, John C. Browne, John G. Bullock, Samuel Castner, jun., F. William Geisse, H. H. Furness, jun., William H. Rau, William H. Roberts, Benjamin Sharp, M.D., Walter P. Stokes, Henry Troth, and George Vaux, jun., Directors. Anthony W. Robinson, Treasurer. Edmund Stirling, 4517 Kingsessing Avenue, West Philadelphia, Secretary.

Pittsburg (Pa.) Amateur Photographers' Society.—Established 1886. Incorporated 1896. Meetings held at the Pittsburgh Carnegie Library. C. C. Craft. President. E. E. Kellar, Vice-President. C. C. Craft, E. E. Kellar, W. S. Clow, A. R. Neeb, H. L. Christy, W. J. Boston, W. J. Hunker, L. S. Clarke, and J. H. Hunter, Board of Trustees. W. J. Hunker, Treasurer. Joseph H. Hunter, 520 Green Street, Pittsburg, Pa., U.S.A., Secretary.

Pittsfield Camera Club.—Established February 1, 1892. Meetings held at houses of members. J. F. Middleton, President. J. D. Roscoe, Vice-President. J. F. Middleton, J. D. Roscoe, J. E. Colton, J. H. Musgrove, A. N. French, C. G. Tompkins, and S. S. Stowell, Executive Committee. A. N. French, C. S. Meigs, and J. E. Colton, Lantern-slide Committee. J. H. Musgrove, Treasurer. J. E. Colton, 768 North Street, Pittsfield, Mass., U.S.A., Secretary.

Portland (Maine) Camera Club.—Established 1891. Meetings held at the Club Rooms. Stanley P. Warren, M.D., President. C. T. Whipple, Treasurer. Frederick Fox, jun., 66 Union Street, Portland, Maine, U.S.A., Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—*Continued.*

Plainfield (*N. J.*) *Camera Club.*—Established 1887. Meetings held at the Club Gallery, Babcock Building. Harold Serrell, President. John E. Stewart, Vice-President. H. Serrell, J. E. Stewart, J. Hervey Doane, Mrs. A. W. Rand, Otto Arens, and Robert L. Lee, Board of Directors. Mrs. A. W. Rand, Treasurer. J. Hervey Doane, 115 Park Avenue, Plainfield, N.J., U.S.A., Secretary.

Postal Photographic Club.—Established December, 1888. Albert J. Le Breton (Washington, D.C.), President. Frank A. Marble, North Adams, Mass., Secretary and Treasurer.

Providence Camera Club.—Established 1883. Incorporated 1889. Club Rooms, 87 Weybosset Street, Providence, R.I. Frederick P. Wilbur, President. W. Penn Mather, Vice-President. Frederick P. Wilbur, F. E. Leonard, J. E. Davison, E. A. Darling, J. A. Miller, jun., F. C. Hodgman, C. A. Stoddard, J. H. Tucker, and R. C. Fuller, Executive Committee. C. A. Stoddard, E. A. Darling, and F. P. Wilbur, Room Committee. R. C. Fuller, J. A. Miller, jun., and F. E. Leonard, Lantern Committee. J. E. Davison, F. C. Hodgman, and J. H. Tucker, Entertainment Committee. Charles A. Stoddard, Librarian. Edmund A. Darling, Treasurer. F. E. Leonard, 75 Warren Avenue, Pawtucket, Recording Secretary. J. Eliot Davison, Pawtucket, Corresponding Secretary.

Putnam (*Conn.*) *Camera Club.*—Established January, 1888. Headquarters at its Club Rooms, Putnam, Connecticut. Regular Meetings are held on the first Friday in each month. The Annual Field Day occurs on the first Wednesday in June. George E. Dresser, President. Edward F. Whitmore, Treasurer. Eric H. Johnson, Putnam, Connecticut, U.S.A., Secretary.

San Diego (*Cal.*) *Camera Club.*—Established 1892. Meetings are held at D Street between Fourth and Fifth Streets. Dr. Joseph Rhodes, President. Charles Wellborn, Vice-President. Miss Laura B. Anderson, Treasurer. W. W. Whiston, 1934 Fourth Street, San Diego, Cal., U.S.A., Secretary.

Schuylkill Camera Club.—Established July 5, 1889. Meetings are held at the Q.O.O.F. Hall, Market Street, Pottsville, Pa. A. W. Sheafer, President. Miss Elena Roads, Vice-President. The Officers are the Committee. W. L. Sheafer, Treasurer. B. S. Simonds, 1339 West Norwegian Street, Pottsville, Pa., Secretary.

Society of Amateur Photographers of New York.—Established March 10, 1884. Meetings are held at 113 West Thirty-eighth Street. C. C. Roumage, President. Dr. J. H. Stebbins, jun., Vice-President. Dr. J. T. Nagle, E. T. Birdsall, Albert Stetson, Louis T. Brush, C. W. Canfield, Harry Coutant, G. F. Basset, and Frank M. Hale, Board of Directors. W. E. Johnson, Treasurer. R. L. Bracklow, Recording Secretary. T. J. Burton, 113 West Thirty-eighth Street, New York City, U.S.A., Corresponding Secretary.

Springfield (*Mass.*) *Camera Club.*—Organized 1886. Meetings are held at State and Dwight Streets, Springfield, Mass., U.S.A. William B. Sleigh, President. William B. Sleigh, Bion D. Wheeler, William P. Draper, Andrew N. Wilton, and Hinsdale Smith, Executive Committee. A. D Copeland and George H. Van Norman, Room Committee. Bion D. Wheeler, 307 Main Street, Springfield, Mass., U.S.A., Secretary.

Stevens (*Hoboken, N. J.*) *Photographic Society.*—Established 1880. Meetings held at the Stevens Institute, Hoboken, N.J. R. P. Jennings, President. — Ode, Vice-President. L. M. De Azevedo and Jos. Stehlin, Committee. Charles L. Wachter, Treasurer. E. C. Voorhees, Stevens Institute, Hoboken N.J., U.S.A., Secretary

AMERICAN PHOTOGRAPHIC SOCIETIES—*Continued.*

St. Louis Camera Club.—Established 1885. Meetings held at 911 North Vandeventer Avenue. Walter H. Wilcox, President. M. T. Corwin, Vice-President. Charles M. Alexander, Chairman of the Lantern Slide Committee. H. B. Alexander, 4028 Westminster Place, St. Louis Mo., U.S.A. Secretary and Treasurer.

St. Louis Photographic Society.—Established December, 1896. Meetings held at the Rooms in Y.M.C.A. Building. Grand and Franklin Avenues. Robert E. M. Bain, President. John B. Holman, Vice-President. John D. Elliott, 321 Locust Street, St. Louis, Mo., Secretary and Treasurer.

St. Paul Camera Club.—Established 1892. Meetings are held at corner of Third and Jackson Street, St. Paul, Minn. James Paris, President. D. F. Brown, Vice-President. W. B. Thorne, Treasurer. W. J. Sonnen, c/o St. Paul Fire and Marine Insurance Company, St. Paul, Minn., U.S.A., Secretary.

Sunny Side Camera Club.—Established 1891. Meetings are held at 5900 South Broadway, St. Louis, Mo. Professor William A. Bricner, 1235 South Broadway, St. Louis, Mo., U.S.A., Secretary.

Syracuse Camera Club.—Organized October, 1886. Incorporated January 19, 1892. Meetings held at Butler Block, 322 South Salina Street, Syracuse, N.Y. Herbert F. Smith, President. George E. Timmins, Vice-President. The President, Vice-President, Secretary, Treasurer, and S. W. Rose, Dr. A. Clifford Mercer, F. J. Schnauber, and F. L. Barnes, Board of Directors. Leray Eldredge, Treasurer. Frederick W. Field, c/o Solway Process Company, Syracuse, N.Y., U.S.A., Secretary.

Tech Camera Club.—Established September, 1889. Meetings, bi-monthly at half-past seven p.m., in the Boynton Hall of the Polytechnic Institute Worcester, Mass. Dark room and Printing room also at Boynton Hall. The purpose of the Meetings is to discuss photographic subjects and, as far as possible, to diffuse a knowledge of the science and art among the members of the Institute. The Executive Committee transact all business connected with the Club. H. J. Fuller, President. A. J. Smith, Vice-President. J. W. Higgins, 228 West Street, Worcester, Mass., U.S.A., Treasurer and Secretary.

Technology Photographic Society.—Established 1893. Meetings are held at Massachusetts Institute of Technology, Boyleston Street, Boston, Mass. Herman A. Poppenhusen, President. Welles M. Partridge, Vice-President. President, Vice-President, Secretary, Treasurer, and Frederick Kleinschmidt, Committee. Arthur C. Lawley, Treasurer. E. Johnson Loring, Mass. Inst. Tech., Boston, Mass., U.S.A., Secretary.

Waterbury Photographic Society.—Established 1888. Meetings are held at Platt's Block, Waterbury, Conn. Oscar A. Ziglatzki, President. George F. Hodges, Vice-President. Henry T. Stedman, George H. Ward, and George Husker, Executive Committee. Henry T. Stedman, Treasurer. Hollyday Emery, Waterbury, Conn., U.S.A., Secretary.

Watertown (N. Y.) Camera Club.—Meetings held at 4 Paddock Arcade, Watertown, N.Y. A. R. Wilson, President. George Mowe, Treasurer. C. A. Wilson, 2½ Public Square, Watertown, N.Y., U.S.A., Secretary.

Worcester Camera Club.—Re-established 1892. Meetings held at Walker Building, 405 Main Street, Worcester, Mass. Daniel F. Gay, 214 Main Street, Worcester, Mass., U.S.A., Secretary.

Young Ladies' Camera Club.—Established 1895. Meetings are held at Y.W.C.A. Rooms, 808 Nicollet Avenue, Minneapolis, Minn. Miss M. E. McIntyre, 1833 Portland Avenue, Minneapolis, Minn., U.S.A., Secretary.

FRENCH FLUID MEASURES.

THE cubic centimètre, usually represented by 'c. c.,' is the unit of the French measurement for liquids. It contains nearly seventeen minims of water; in reality, it contains 16·896 minims. The weight of this quantity of water is one gramme. Hence it will be seen that the cubic centimètre and the gramme bear to each other the same relation as our drachm for solids and the drachm for fluids, or as the minim and the grain. The following table will prove to be sufficiently accurate for photographic purposes:—

1	cubic centimètre	=	17	minims (as near as possible).					
2	cubic centimètres	=	34	,,					
3	,,	=	51	,,					
4	,,	=	68	,,	or	1	drachm	8	minims.
5	,,	=	85	,,	,,	1	,,	25	,,
6	,,	=	102	,,	,,	1	,,	42	,,
7	,,	=	119	,,	,,	1	,,	59	,,
8	,,	=	136	,,	,,	2	drachms	16	,,
9	,,	=	153	,,	,,	2	,,	33	,,
10	,,	=	170	,,	,,	2	,,	50	,,
20	,,	=	340	,,	,,	5	,,	40	,,
30	,,	=	510	,,	,,	1	ounce	0 drachm	30 minims.
40	,,	=	680	,,	,,	1	,,	3 drachms	20 ,,
50	,,	=	850	,,	,,	1	,,	6 ,,	10 ,,
60	,,	=	1020	,,	,,	2	ounces	1 ,,	0 ,,
70	,,	=	1190	,,	,,	2	,,	3 ,,	50 ,,
80	,,	=	1360	,,	,,	2	,,	6 ,,	40 ,,
90	,,	=	1530	,,	,,	3	,,	1 ,,	30 ,,
100	,,	=	1700	,,	,,	3	,,	4 ,,	20 ,,

THE CONVERSION OF FRENCH INTO ENGLISH WEIGHTS.

ALTHOUGH a gramme is equal to 15·4346 grains, the decimal is one which can never be used by photographers; hence in the following table it is assumed to be 15½ grains, which is the nearest approach that can be made to *practical* accuracy:

1	gramme	=	15½	grains.					
2	grammes	=	30⅘	,,					
3	,,	=	46⅕	,,					
4	,,	=	61⅗	,,	..... or	1	drachm	1⅘	grain.
5	,,	=	77	,,	..... ,,	1	,,	17	grains.
6	,,	=	92⅖	,,	..... ,,	1	,,	32⅖	,,
7	,,	=	107⅘	,,	..... ,,	1	,,	47⅘	,,
8	,,	=	123⅕	,,	..... ,,	2	drachms	3⅕	,,
9	,,	=	138⅗	,,	..... ,,	2	,,	18⅗	,,
10	,,	=	154	,,	..... ,,	2	,,	34	,,
11	,,	=	169⅘	,,	..... ,,	2	,,	49⅘	,,
12	,,	=	184⅕	,,	..... ,,	3	,,	4⅕	,,
13	,,	=	200⅕	,,	..... ,,	3	,,	20⅕	,,
14	,,	=	215⅗	,,	..... ,,	3	,,	35⅗	,,
15	,,	=	231	,,	..... ,,	3	,,	51	,,
16	,,	=	246⅘	,,	..... ,,	4	,,	6⅘	,,
17	,,	=	261⅕	,,	..... ,,	4	,,	21⅕	,,
18	,,	=	277⅕	,,	..... ,,	4	,,	37⅕	,,
19	,,	=	292⅗	,,	..... ,,	4	,,	52⅗	,,
20	,,	=	308	,,	..... ,,	5	,,	8	,,
30	,,	=	462	,,	..... ,,	7	,,	42	,,
40	,,	=	616	,,	..... ,,	10	,,	16	,,
50	,,	=	770	,,	..... ,,	12	,,	50	,,
60	,,	=	924	,,	..... ,,	15	,,	24	,,
70	,,	=	1078	,,	..... ,,	17	,,	58	,,
80	,,	=	1232	,,	..... ,,	20	,,	32	,,
90	,,	=	1386	,,	..... ,,	23	,,	6	,,
100	,,	=	1540	,,	..... ,,	25	,,	40	,,

THE PHOTOGRAPHIC COPYRIGHT UNION.

The following are the rules as amended at the General Meeting, November 22nd, 1895.

Committee.

President, Frank Bishop (Marion & Co.). *Vice-President*, Joseph J. Elliott (Elliott & Fry, Baker Street). *Treasurer*, Wm. Grove (Window & Grove, Baker Street). *Hon. Secretary*, J. Lillie Mitchell (London Stereoscopic Co., Ld.), 54 Cheapside, London, E.C. W. Crooke (Edinburgh), Wm. Downey (W. & D. Downey, Ebury Street), Alfred Ellis (Upper Baker Street), E. Frith (Frith & Co., Reigate), Jas. Lafayette (Dublin), Louis Wilson (G. W. Wilson & Co., Ld., Aberdeen), Warwick Brookes (Manchester), J. W. McGrath (Cork), F. M. Sutcliffe (Whitby). *Solicitors*, Messrs. Neish, Howell, & Macfarlane, 66 Watling Street, London, E.C. *Secretary*, Henry Gower, Photographic Section, London Chamber of Commerce, Botolph House, Eastcheap, London, E.C.

Title.

I.—The name of the Society shall be the 'Photographic Copyright Union.'

Objects.

II.—The objects of the Union shall be to secure and protect Photographic Copyrights, to suppress piracies, and generally to promote the interests of the profession.

Membership.

III.—Photographers who have given their signed adherence to the Union shall be considered duly elected, and all professional and amateur photographers and photographic publishers shall be qualified to become Members of the Union under the rules, provided they be introduced by a Member.

IV.—The Committee shall have the power of nominating as Honorary Members any persons resident abroad or in the colonies, whom they may in their discretion select as corresponding Agents for the Union.

Funds.

V.—There shall be a Donation Fund and a Reserve Fund. The Donation Fund shall be deposited in the name of the Union, and cheques drawn therefrom as per Rule XI. The Reserve Fund shall be deposited at the Bankers in the joint names of the President and Treasurer of the Union, and only in the event of a deficiency in the Donation Fund shall expenses be defrayed out of the Reserve Fund.

VI.—There shall be no Annual Subscription.

VII.—The Working Expenses of the Union shall be met by Voluntary Donations.

Reserve Fund.

VIII.—A Reserve Fund shall be created, to consist of Voluntary Donations and of such other funds as may be found available for the purpose.

Officers.

IX.—The management of the Union shall be by a Committee of nine Members (but with power to increase their number), two of whom shall

retire annually, but shall be eligible for re-election. The Committee shall elect annually from among themselves a President, a Vice-President, a Treasurer, and an Hon. Secretary, and the Committee shall be Members of the Photographic Trade Section of the London Chamber of Commerce.

X.—The mode of Election of Members of the Committee shall be by the vote of the General Members of the Union.

XI.—The Bankers of the Union shall be the National Provincial Bank of England, St. Marylebone Branch, Baker Street, W. All cheques shall be signed by the Treasurer, and a Member of the Committee, and counter-signed by the Secretary.

XII.—The Standing Counsel, Solicitors, and Secretary of the Union shall be appointed by the Committee, and shall hold office for such time and upon such terms as may be determined by the Committee. No Member of the Committee shall be eligible as Auditor.

Meetings of Committee.

XIII.—The Committee shall meet monthly on the first Wednesday in each month, but a Meeting may be called by the Secretary, upon the request of any two Members of the Committee. Three clear days at least must elapse between the issue of the notices (unless the Secretary shall mark them 'very urgent') and the day for which the Meeting is called.

XIV.—Five shall form a quorum of the Committee, except where otherwise hereinafter provided. Questions arising at any Meeting of the Committee shall be decided by a majority of votes, and, in case of an equality of votes, the Chairman of the Meeting shall, in addition to his original vote, have a casting vote.

Accounts.

XV.—Proper books of account shall be kept at the offices of the Union, and all such accounts shall be audited by the Auditors once in every year, and oftener if the Committee shall so determine. The Auditors shall be elected by the Members of the Union present at the General Meeting. All moneys received by the Secretary shall be paid to the Treasurer within seven days.

General Meetings.

XVI.—A General Meeting of the Union shall be held at the end of September or beginning of October in each year, and of such Meeting seven days' notice shall be sent to each Member, together with the report (if any) of the Committee, and an abstract or short statement of the accounts of the Union, together with a note of any alterations of and additions to the Rules that may be proposed. Extraordinary General Meetings shall be summoned at any time, upon the requisition of twenty Members of the Union. At any such Meeting the Rules of the Union may be added to or altered by the vote of two-thirds of the Members present, provided that fourteen days' prior notice has been given to the Secretary stating the proposed additions or alterations. Fifteen Members shall form a quorum at such Meetings, and the Chairman shall have a casting vote.

Work of the Union.

XVII.—The Society will undertake to register the work of any Member who desires them to do so upon the payment of 1*s.* 6*d.*, which

is inclusive of the fee of 1*s.* at Stationers' Hall, but the Union shall incur no responsibility in case any such registration shall be held to be defective by any Court of Law.

XVIII.—Any Member shall have the privilege of referring the application of any Publisher or other person, who may desire to copy his works, to the Secretary to arrange terms for the same. A record will be kept of all licences and permissions negotiated by the Union, who shall be entitled to charge a commission of ten per cent. on all sums obtained by them in this manner for a Member.

XIX.—Members whose work has been infringed, and who wish the Union to obtain redress for them, must send the Secretary an original photograph, the piracy complained of, a copy of the registration form, the place and date of purchase of the piracy, and the name and address of the person by whom purchased, together with all correspondence that may have any reference to the piracy in question. The Secretary, having satisfied himself and any one Member of the Committee that the essential preliminaries to registration have been duly observed, shall then submit the case to the Solicitor, who will advise the Secretary upon it. A quorum of three of the Committee shall have power to give the Solicitor authority to proceed, but in urgent cases an action may be commenced by the Solicitor, should he deem it advisable, before the Committee have time to sit, but not before obtaining the written authority of the Member or Members interested, and in such cases, until the action of the Solicitor be ratified by three Members of the Committee, the Union shall not be liable for any costs.

XX.—If when a case, at the request of a Member, has been conducted by the Union, and compensation by way of penalties, or damages, or otherwise, be obtained, the net proceeds shall be divisible as follows: Two-thirds shall go to the Member whose copyright has been infringed, and one-third to the Reserve Fund of the Union. If no damages are obtained, then the expenses shall be borne as follows: Fifty per cent. shall be paid to the Union by the Member on whose behalf the action was taken, and thereafter fifty per cent. by the Union.

XXI.—In all cases where the aid of the Union has been invoked, and compensation obtained for a Member without litigation, the Union shall deduct twenty-five per cent. of the amount obtained after deducting expenses, and shall pay the balance to the Member.

XXII.—That the Committee shall have the power, should they deem it advisable, to give such rewards as they shall agree upon to any one who gives such information as shall lead to the conviction of an offender, or to successful litigation.

XXIII.—That no Member shall allow a Copyright portrait photograph, or figure subject, belonging to him to be reproduced (whether registered or not) at a less fee than 10*s.* 6*d.* up to and including cabinet size, 6 × 4 inches, or for one guinea reproduced beyond cabinet size and up to and including 12 × 10 inches, on each occasion and for each different publication or form in which it is used, but he shall be at liberty to charge a larger fee, according to his own ideas as to its value. No Member shall allow a Copyright photograph of landscape or public ceremonials which belong to him to be reproduced for a less fee than 10*s.* 6*d.*

XXIV.—That Members be invited to seek advice and information of the Union through the Secretary, which shall be given free of charge,

XXV.—That the Society will assist Members in assigning Copyrights, and help them in every possible way in all matters relating to Copyrights.

The following are—

COPIES OF FORMS ISSUED BY THE PHOTOGRAPHIC COPYRIGHT UNION.

[2d. per dozen.—*Prices include Postage.*]

FORM A.]

Photographic Section of the London Chamber of Commerce.

BOTOLPH HOUSE, EASTCHEAP.

Photographic Copyright Union.

In reply to your request for permission to copy my photograph of.....
.....I beg to state that, being a Member of the above Photographic Copyright Union, I am bound by its regulations to make a charge for the permit required. My fee in this case will be.....and on receipt of this amount I will forward you official permission. .....

.....

NOTICE.—Any one copying my photographs for the purposes of reproduction or illustration either in Newspaper, Magazine, Book, or any other form, without first obtaining my permission, render themselves liable to an action for infringement of my copyright.

FORM B.] Receipt granting permission to use Copyright Photographs.

Issued by the Photographic Copyright Union.

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.....*day of*... .....189..

In consideration of the sum of.....hereby acknowledged, you are authorised to reproduce, by.....process, my Copyright Photograph of.....in any size not exceeding.....,
my name to be printed under each impression.

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NOTICE.—Any one copying my photographs for the purposes of reproduction or illustration either in Newspaper, Magazine, Book, or any other form, without first obtaining my permission, render themselves liable to an action for infringement of my copyright.

FORM C.] Receipt granting permission to use Copyright Photographs.

Issued by the Photographic Copyright Union.

.....

.....

.....*day of*.....189...

In consideration of the sum of.....*hereby acknowledged, you are authorised to reproduce, by*.....*process, our Copyright Photograph of*.....*in any size not exceeding*..... *our name to be printed under each impression.*

This Permission and Fee is for reproduction in..... *and for one issue only, and the subject may not be reproduced or sold as an independent illustration separate from the above publication and its accompanying letterpress. If any other use is desired, a fresh Permission and Payment is required.* .....

NOTICE.—Any one copying our photographs for the purposes of reproduction or illustration either in Newspaper, Magazine, Book, or any other form, without first obtaining our permission, render themselves liable to an action for infringement of our copyright.

[For the information of those interested in the law of copyright, the Act relating thereto is reproduced in the following pages.]

THE COPYRIGHT (WORKS OF ART) ACT (1862).

An Act for amending the Law relating to Coprright in Works of the Fine Arts, and for repressing the Commission of Fraud in the Production and Sale of such Works.

WHEREAS by law, as now established, the authors of paintings, drawings, and photographs, have no copyright in such their works, and it is expedient that the law should in that respect be amended: Be it therefore enacted by the Queen's Most Excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

Copyright in Works Hereafter Made or Sold to Vest in the Author for his Life, and for Seven Years after his Death.

1. The author, being a *British* subject or resident within the dominions of the Crown, of every original painting, drawing, and photograph which shall be or shall have been made either in the *British* dominions or elsewhere, and which shall not have been sold or disposed of before the commencement of this Act, and his assigns, shall have the sole and exclusive right of copying, engraving, reproducing and multiplying such painting or drawing, and the design thereof, or such photograph, and the negative thereof, by any means and of any size, for the term of the natural life of such author, and seven years after his death; provided that when any painting or drawing, or the negative of any photograph, shall for the first time after the passing of this Act be sold or disposed of, or shall be made or executed for or on behalf of any other person for a good or a valuable consideration, the person so selling or disposing of or making or executing the same shall not retain the copyright thereof, unless it be expressly reserved to him by agreement in writing, signed, at or before the time of such sale or disposition, by the vendee or assignee of such painting or drawing, or of such negative of a photograph, or to the person for or on whose behalf the same shall be so made or executed, but the copyright shall belong to the vendee or assignee of such painting or drawing, or of such negative of a photograph, or to the person for or on whose behalf the same shall have been made or executed; nor shall the vendee or assignee thereof be entitled to any such copyright, unless, at or before the time of such sale or disposition, and agreement in writing, signed by the person so selling or disposing of the same, or by his agent duly authorised, shall have been made to that effect.

Copyright not to Prevent the Representation of the Same Subjects in Other Works.

2. Nothing herein contained shall prejudice the right of any person to copy or use any work in which there shall be no copyright, or to represent any scene or object, notwithstanding that there may be copyright in some representation of such scene or object.

Assignments, Licenses, &c., to be in Writing.

3. All copyright under this Act shall be deemed personal or moveable estate, and shall be assignable at law, and every assignment thereof, and every license to use or copy by any means or process the design or work which shall be the subject of such copyright, shall be made by some note or memorandum in writing, to be signed by the proprietor of the copyright, or by his agent appointed for that purpose in writing.

Register of Proprietors of Copyrights in Paintings, Drawings, and Photographs to be kept at Stationers' Hall, as in 5 & 6 Vict., cap. 45.

4. There shall be kept at the Hall of the Stationers' Company, by the Officer appointed by the said Company for the purposes of the Act passed in sixth year of Her present Majesty, intituled *An Act to Amend the Law of Copyright*, a book or books, entitled 'The Register of Proprietors of Copyright in Paintings, Drawings, and Photographs,' wherein shall be entered a memorandum of every copyright to which any person shall be entitled under this Act, and also of every subsequent assignment of any such copyright; and such memorandum shall contain a statement of the date of such agreement or assignment, and of the names of the parties thereto, and of the name and place of abode of the person in whom such copyright shall be vested by virtue thereof, and of the name and place of abode of the author of the work in which there shall be such copyright, together with a short description of the nature and subject of such work and in addition thereto, if the person registering shall so desire, a sketch, outline, or photograph of the said work, and no proprietor of any such copyright shall be entitled to the benefit of this Act until such registration, and no action shall be sustainable nor any penalty recoverable in respect of anything done before registration.

Certain Enactments of 5 and 6 Vict., c. 45, to Apply to the Books to be Kept under this Act.

5. The several enactments in the said Act of the sixth year of Her present Majesty contained, with relation to keeping the register book thereby required, and the inspection thereof, the searches therein, and the delivery of certified and stamped copies thereof, the reception of such copies in evidence, the making of false entries in the said book, and the production in evidence of papers falsely purporting to be copies of entries in the said book, the application to the Courts and Judges by persons aggrieved by entries in the said book, and the expunging and varying such entries, shall apply to the book or books to be kept by virtue of this Act, and to the entries and assignments of copyright and proprietorship therein under this Act, in such and the same manner as if such enactments were here expressly enacted in relation thereto, save and except that the forms of entry prescribed by the said Act of the sixth year of Her present Majesty may be varied to meet the circumstances of the case, and that the sum to be demanded by the officer of the said Company of Stationers for making any entry required by this Act shall be one shilling only.

Penalties on Infringement of Copyright.

6. If the author of any painting, drawing, or photograph in which there shall be subsisting copyright, after having sold or disposed of such

copyright, or if any other person, not being the proprietor for the time being of copyright in any painting, drawing, or photograph, shall, without the consent of such proprietor, repeat, copy, colourably imitate, or otherwise multiply for sale, hire, exhibition, or distribution, or cause or procure to be repeated, copied, colourably imitated, or otherwise multiplied for sale, hire, exhibition, or distribution, any such work or the design thereof, or, knowing that any such repetition, copy, or other imitation has been unlawfully made, shall import into any part of the United Kingdom, or sell, publish, let to hire, exhibit, or distribute, or offer for sale, hire, exhibition, or distribution, or cause or procure to be imported, sold, published, let to hire, distributed, or offered for sale, hire, exhibition, or distribution, any repetition, copy, or imitation of the said work, or of the design thereof, made without such consent as aforesaid, such person for every such offence shall forfeit to the proprietor of the copyright for the time being a sum not exceeding ten pounds; and all such repetitions, copies, and imitations, made without such consent as aforesaid, and all negatives of photographs made for the purpose of obtaining such copies, shall be forfeited to the proprietor of the copyright.

Penalties on Fraudulent Productions and Sales.

7. No person shall do or cause to be done any or either of the following Acts: that is to say,—

First, no person shall fraudulently sign or otherwise affix, or fraudulently cause to be signed or otherwise affixed, to or upon any painting, drawing, or photograph, or the negative thereof, any name, initials, or monogram:

Secondly, no person shall fraudulently sell, publish, exhibit, or dispose of, or offer for sale, exhibition, or distribution, any painting, drawing, or photograph, or negative of a photograph, having thereon the name, initials, or monogram of a person who did not execute or make such work:

Thirdly, no person shall fraudulently utter, dispose, or put off, or cause to be uttered or disposed of, any copy or colourable imitation of any painting, drawing, or photograph, or negative of a photograph, whether there shall be subsisting copyright therein or not, as having been made or executed by the author or maker of the original work from which such copy or limitation shall have been taken.

Fourthly, where the author or maker of any painting, drawing, or photograph, or negative of a photograph, made either before or after the passing of this Act, shall have sold or otherwise parted with the possession of such work, if any alteration be afterwards made therein by any other person, by addition or otherwise, no person shall be at liberty, during the life of the author or maker of such work, without his consent, to make or knowingly to sell or publish, or offer for sale, such work or any copies of such work so altered as aforesaid, or of any part thereof, as or for the unaltered work of such author or maker.

Penalties.

Every offender under this section shall, upon conviction, forfeit to the person aggrieved a sum not exceeding ten pounds, or not exceeding double the full price, if any, at which all such copies, engravings,

imitations, or altered works shall have been sold or offered for sale; and all such copies, engravings, imitations, or altered works shall be forfeited to the person, or the assigns, or legal representatives of the person whose name, initials, or monogram shall be so fraudulently signed or affixed thereto, or to whom such spurious or altered work shall be so fraudulently or falsely ascribed as aforesaid: Provided always, that the penalties imposed by this section shall not be incurred unless the person whose name, initials, or monogram shall be so fraudulently signed or affixed, or to whom such spurious or altered work shall be so fraudulently or falsely ascribed as beforesaid, shall have been living at or within twenty years next before the time when the offence may have been committed.

Recovery of Pecuniary Penalties.

8. All pecuniary penalties which shall be incurred, and all such unlawful copies, imitations, and all other effects and things as shall have been forfeited by offenders, pursuant to this Act, and pursuant to any Act for the protection of copyright engravings, may be recovered by the person hereinbefore and in any such Act as aforesaid empowered to recover the same respectively, and hereinafter called the complainant or the complainer, as follows:

In *England* and *Ireland*, either by action against the party offending or by summary proceeding before any two Justices having jurisdiction where the party offending resides:

In *Scotland*, by action before the Court of Session in ordinary form, or by summary action before the Sheriff of the County where the offence may be committed or the offender resides, who, upon proof of the offence or offences, either by confession of the party offending or by the oath or affirmation of one or more credible witnesses, shall convict the offender, and find him liable to the penalty or penalties aforesaid, as also in expenses; and it shall be lawful for the Sheriff, in pronouncing such judgment for the penalty or penalties and costs, to insert in such judgment a warrant, in the event of such penalty or penalties and costs not being paid, to levy and recover the amount of the same by poinding: Provided always, that it shall be lawful to the Sheriff, in the event of his dismissing the action and assoilzieing the defender, to find the complainer liable in expenses, and any judgment as to be pronounced by the Sheriff in such summary application shall be final and conclusive, and not subject to review by advocation, suspension, reduction, or otherwise.

Superior Courts of Record in which any Action is Pending may Make an Order for an Injunction, Inspection, or Account.

9. In any action in any of Her Majesty's Superior Courts of Record at *Westminster* and in *Dublin*, for the infringement of any such copyright as aforesaid, it shall be lawful for the Court in which such action is pending, if the Court be then sitting, or if the Court be not sitting then, for a judge of such Court, on the application of the plaintiff or defendant respectively, to make such order for an injunction, inspection, or account, and to give such direction respecting such action, injunction, inspection, or account, and the proceedings therein respectively, as to such Court or Judge may seem fit.

Importation of Pirated Works Prohibited.—Application in such Cases of Customs Act.

10. All repetitions, copies, or imitations of paintings, drawings, or photographs, wherein or in the design whereof there shall be subsisting copyright under this Act, and all repetitions, copies, and imitations of the design of any such painting or drawing, or of the negative of any such photograph, which, contrary to the provisions of this Act, shall have been made in any Foreign State, or in any part of the *British* dominions, are hereby absolutely prohibited to be imported into any part of the United Kingdom except by or with the consent of the proprietor of the copyright thereof, or his agent authorised in writing; and if the proprietor of any such copyright, or his agent, shall declare that any goods imported are repetitions, copies, or imitations of any such painting, drawing, or photograph, or of the negative of any such photograph, and so prohibited as aforesaid, then such goods may be detained by the Officers of Her Majesty's Customs.

Saving of Right to Bring Action for Damages.

11. If the author of any painting, drawing, or photograph, in which there shall be subsisting copyright, after having sold or otherwise disposed of such copyright, or if any other person, not being the proprietor for the time being of such copyright, shall, without the consent of such proprietor, repeat, copy, colourably imitate, or otherwise multiply, or cause to procure to be repeated, copied, or colourably imitated, or otherwise multiplied, for sale, hire, exhibition, or distribution, any such work or the design thereof, or the negative of any such photograph, or shall import or cause to be imported into any part of the United Kingdom, or sell, publish, let to hire, exhibit, or distribute, or offer for sale, hire, exhibition, or distribution, or cause or procure to be sold, published, let to hire, exhibited, or distributed, or offered for sale, hire, exhibition, or distribution, any repetition, copy, or imitation of such work, or the design thereof, or the negative of any such photograph, made without such consent as aforesaid, then every such proprietor, in addition to the remedies hereby given for the recovery of any such penalties, and forfeiture of any such things as aforesaid, may recover damages by and in a special action on the case, to be brought against the person so offending, and may in such action recover and enforce the delivery to him of all unlawful repetitions, copies, and imitations, and negatives of photographs, or may recover damages for the retention or conversion thereof: Provided that nothing herein contained, nor any proceeding, conviction, or judgment, for any act hereby forbidden, shall effect any remedy which any person aggrieved by such Act may be entitled to either at law or in equity.

Provisions of 7 & 8 Vict., c. 12, to be Considered as Included in this Act.

12. This Act shall be considered as including the provisions of the Act passed in the Session of Parliament held in the seventh and eighth years of Her present Majesty, intituled *An Act to Amend the Law relating to International Copyright*, in the same manner as if such provisions were part of this Act.

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SUMMARY.

One of the features of the past year has been the great development of animated photography, which forms the subject of the editorial article that follows this summary. This development has been so marked as to give an unmistakable impetus to several branches of photographic industry—notably celluloid film and apparatus manufacture. We have every confidence that still further developments await this department of photography.

Colour Photography.

Colour photography in the earlier part of the year attracted no inconsiderable amount of notice, but of actual progress there is nothing to record. Mr. Bennetto, in the spring, showed by projection a number of transparencies in natural colours, which excited much admiration and discussion; but the process was not revealed, and at the time of writing nothing whatever is known of it. In February a process due to Messrs. Dansac & Chassagne was introduced. The results, in the forms both of transparencies and albumen paper prints, were put forward as natural colour effects obtained by what was alleged to be selective colour absorption —that is to say, the surface of the transparency or print was understood to be treated with a special solution which imparted to it the property, when red, green, and blue solutions were applied to it, of selecting the colours of the original in their proper order and relation. Notwithstanding the association of the names of some eminent men with the process, and the attempt to publicly demonstrate that it really was what it was alleged to be, there has been a complete failure to substantiate the claims that were made for it, and it is generally agreed that the Dansac-Chassagne process of natural-colour photography was simply a method of colouring prints with aniline compounds. On its merits the subject is not entitled to a more extended reference here, and those who require further details of a by no means satisfactory chapter in the chequered history of colour photography are referred to the volume of The British Journal of Photography for 1897, wherein the Dansac-Chassagne process receives considerable attention in detail.

Halation—Radiography—Acetylene, &c.

Halation and the backing of plates is a subject to which practical photographers have addressed themselves with great interest during the year, and in the section of the Almanac headed 'Practical Notes and Experiences of the Year,' the reader will find a great deal of information bearing on the various preparations advocated for application to the glass sides of plates. Some of the dry-plate makers now send out plates ready backed with anti-halative substances that are removable without difficulty.

Radiography has failed to sustain its interest among photographers, although it is still a subject of unremitting experiment and investigation amongst chemists and physicists. In hospital, medical, and surgical practice, however, it is of enormous value, and it appears probable that, as an adjunct of the healing art, Professor Röntgen's discovery will long be gratefully recognised. It is interesting to note that Foreign Custom House officials are stated to find the X rays directly serviceable in the examination of travellers' luggage, &c.

The action of the Home Office in placing calcic carbide under the provisions of the Explosives Act, early in the year, threw a check on the progress of acetylene as a photographic illuminant, but the regulation has been modified to the extent of permitting small quantities of the carbide to be stored, and, with the insurance offices disposed to take a less unfavourable view of the danger of the new light, there is hope that the full possibilities of the light for projection and general work will, in due course, be availed of.

General Photography.

In the spring of 1898 the Royal Photographic Society propose holding, at the Crystal Palace, Sydenham, a great International Photographic Exposition, which shall be fully representative of the present position of photography in all its aspects. There is every indication that the Exhibition will be well supported.

The half-tone and three-colour block processes appear to be gaining in public favour, and steady advances are apparent in the qualities of the results.

With regard to ordinary photographic work, practically no change has to be chronicled. Glass as the favourite support for gelatino-bromide emulsion does not appear likely to be soon displaced, although several substitutes have been introduced. Anastigmatic flat-fielded lenses of large aperture are daily coming into greater use, and are gradually displacing older and less efficient forms.

With few exceptions, representative institutions in photography continue to widen their sphere of action. The Royal Photographic Society

is steadily increasing its membership, and, under the Presidency of the Earl of Crawford, is pursuing a policy of usefulness to the cause of photographic progress. The Photographic Convention and the Photographic Copyright Union have records of successful effort to show for the past year of their existence. A reference to the directory of photographic Societies will show that these useful bodies have not decreased in number, and there appears to be no doubt that the hold which photography has secured upon the public as a pursuit and pastime is not slackening.

Due chiefly to the energy of Sir J. Benjamin Stone, M.P., there has been established a National Photographic Record Association, the object of which is to collect photographic records of objects and scenes of interest throughout the British Isles with a view of depositing them in the British Museum, where they may be safely stored and be accessible to the public under proper regulations.

The Diamond Jubilee of Her Majesty led to considerable photographic activity, although, in common with many other industries, photography was said to have suffered from the great displacement of trade which that historical event induced; but, on the whole, from whatsoever point it may be regarded, photography in 1897 exhibited unmistakably progressive tendencies, and the outlook for 1898 is distinctly encouraging and symptomatic of continued progress.

Obituary.

The losses by death to the photographic fraternity during the past year have been unusually heavy, and some well-known names have been removed. They include the following:—

Edgar Pickard the Thornton-Pickard Manufacturing Co.) (April 2, 1897).
F. W. Edwards (October 16, 1897).
George Dawson (July 11, 1897).
T. C. Turner (November 20, 1896).
Napoleon Sarony (of New York).
P. Meagher (May 8, 1897).
R. Kennett (December 4, 1896).
W. H. Harrison (August 10, 1897).
M. Carey Lea (April, 1897).

W. H. Harrison.

Mr. Harrison began life in the employ of the Great Western Railway in the Telegraph Department at Paddington. In 1865 he commenced writing for the *Engineer*. In 1868 he communicated to The British Journal of Photography a remarkable paper describing his discovery of a bromide emulsion dry plate, and also the use of an alkaline developer. In later years he was for some time editor of the *Photographic News*, and contributed to other photographic journals. As a writer on scientific

subjects, photography, engineering, and chemical industries were treated by him in a broad and comprehensive manner, especially those which had any application to photography; and lectures upon chemistry and experimental physics at the Royal Institution and other scientific bodies, both English and foreign, were never lost sight of.

George Dawson.

The late George Dawson, at the time of his death, was in his seventy-seventh year, and will be remembered by reason of his long association with King's College, in the capacity of Professor of Photography. He was formerly one of the editors of The British Journal of Photography, and was joint author, with the late Thomas Sutton, of *The Dictionary of Photography*. He also edited one of the earlier editions of Hardwich's *Photographic Chemistry*.

P. Meagher.

Mr. Meagher had been engaged in the production of photographic cameras for about half a century. He was formerly in the employ of the well-known camera-maker, Ottewill, who may be regarded as the source to which the best school of English camera-making traces its origin. If his name is not associated with the introduction of any very great novelty of design in the construction of cameras—we believe the side flap as a support for the camera body is the only distinctly original feature with which he can be credited—there is no doubt that a Meagher camera was long worthily put forward by practical photographers as a model of efficiency, durability, and excellence of construction.

R. Kennett.

Mr. Kennett, at the time of his death, was aged 79. It was in the year 1874, when the gelatino-bromide process was in the experimental stage, that Mr. Kennett, on June 9, read a paper before the London Photographic Society, in which he fully described his mode of preparing gelatino-bromide pellicle. He was also the inventor of Kennett's stand. There is no doubt that his experiments in the preparation of gelatine pellicle gave a great impetus to dry-plate photography.

M. Carey Lea.

It was not only in connexion with The British Journal of Photography, or with photography, that Mr. Carey Lea was known, for, in spite of his once prolific contributions—and how numerous these were readers of twenty and thirty years ago will remember—he found time to devote himself to other researches, chemical as well as physical, the

results of which were contributed to various scientific papers, but chiefly to *Silliman's Journal*, and occasionally the *Journal of the Franklin Institute*. But it is naturally in connexion with photography that he was best known. One of the earliest, and at that time perhaps one of the most practically useful, of his contributions was that in which he described his plate-cleaning solution, composed of bichromate of potash and sulphuric acid, a mixture that proved so effective, not only for that purpose, but for removing old films, and as a general laboratory detergent, that it became almost universally adopted, and familiarly known as 'Carey Lea.' The ferro-gelatine developer was another of his valuable contributions to wet-plate photographic practice, and consisted of a chemical combination of gelatine with the ordinary iron developer, which resulted in the deposition of the metallic silver, under the influence of the organic matter, in a much finer and closer state of division, and the consequent formation of a denser image. Originally published in 1865, the process of preparation was improved and simplified some years later, and it is not improbable that, had wet plates remained in general use, this combination would, ere now, have entirely displaced pyro, both for development and intensification. Another of his laboratory formulæ, of about the same date, was the method of intensification by means of Schlippe's salt, a sulphide of sodium and antimony, which would, even at the present day, find wider use in process work were it not for the evil-smelling character of the chief material. Mr. Carey Lea's name will be inseparably connected with collodion emulsion whenever the history of emulsion photography may be written. He took up the collodio-bromide process in 1866 or 1867, and kept working at that, or 'washed' emulsion, without intermission, right away until collodion was practically suppressed by gelatine.

This was the great point in Carey Lea's view of emulsion photography —free silver—and to him is due, undoubtedly, the credit of pointing out its use and value, though possibly modern workers, like many of the older ones, would differ from him in some of the details. The late Colonel Wortley, indeed, went further than Carey Lea in the matter of free silver, alleging that it was necessary to *saturate* the emulsion with free silver. Other modifications of the original process consisted in the addition of iodide and chloride of silver to the emulsion, points which also gave rise to very considerable controversy, while, as to the variations in "preservatives" and "organifiers" tried and recommended, it would be impossible to mention them. Carey Lea, however, introduced the method in a practical way of adding the organifier to the emulsion, so that the latter only required to be poured on to the glass and washed before use.

On the introduction of Mr. W. B. Bolton's washed collodion emulsion in 1874, Carey Lea was not slow to recognise its advantages, and at once

began experimenting, with the result that in 1875 or 1876 he published his washed-chlorido-bromide process, possessing a degree of rapidity far surpassing wet collodion. Whether this or similar processes would ever have come into general use is open to question, as the result of Carey Lea's experiments was rather to rob the original process of its simplicity without adding greatly to its advantages. Thus the precipitation of the emulsion, containing a large access of free silver, by means of a solution containing tannin, gallic and acetic acids, may be imagined to be one of some delicacy and requiring some manipulative skill to ensure success.

In 1870 he published a *Manual of Photography*, which went through two or three editions, and, though comparatively little known in this country, it is one of the best and most complete all-round works we have

F. W. Edwards, F.R.P.S.

He first carried on business in the Albany-road as an architectural photographer, and later, for a very long period, at 87, Bellenden-road, Peckham. For about two years he was connected with the firm of W. H. Ward & Co., Limited, Shaftesbury-avenue, and, on leaving them about twelve months ago, he recommenced business on his own account in Newman-street, Oxford-street.

About the time of the erection of the Albert Memorial, his photographs of the groups of statuary forming parts of it attracted attention. Later, his photographs of numerous Tinworth panels, taken on 23 × 18 plates, some of which were exhibited on the walls of the Royal Photographic Society's Exhibitions, brought him more into prominent notice. Latterly, he produced a very large number of cathedral interiors of a similar size. For some years he was a regular exhibitor—principally at the Royal and Falmouth, and received nearly thirty awards.

As a platinotype worker he was well known, and was almost the first, if not the first, to publicly demonstrate the hot-bath process, and handled with great ease prints of nearly fifty inches in length.

In July, 1889, he was unanimously appointed President of the second South London Photographic Society, and was annually, without any opposition, re-elected to that office.

ANIMATED PHOTOGRAPHY.

By The Editor.

The widespread interest with which what is conveniently called 'Animated Photography' is regarded by photographers and the general public, possibly justifies both the belief that its selection as the topic of the principal article in this Almanac will be acceptable to its readers, and the hope that the information here presented may be of service to those of them who have not had an opportunity of studying the subject. I at once admit that the following chapters are by no means exhaustive, but it is probable that they give, in a connected form, a fuller reference to the matter than has hitherto appeared in a photographic publication.

Animated photography, at the time of writing, is obviously only in the earlier stages of development. The wonder and interest which the contemplation on the lantern screen of the representation of objects appearing to move in the order of nature still provokes does not, of course, disguise the fact that much remains to be accomplished in the mechanics of this branch of photography before it can reasonably be claimed that the fullest justice has been done to its possibilities.

It will be observed that I have chosen the term 'animated photography' as the title of this series of chapters. Strictly speaking, its accuracy as a descriptive term is open to question; but, of the innumerable names that have been applied to this branch of photography, it is, perhaps, the one which most easily conveys what is meant in a universally understood form; hence its adoption here.

I.—PERSISTENCE OF VISION.

To understand the principles upon which animated photography is based necessitates some knowledge of the underlying theory involved, viz., persistence of vision; but, fortunately, this does not place a heavy tax on the understanding, as that theory is exceedingly simple to realise. 'The retina of the eye has the physiological property of retaining for a brief time the impression of an image after the object which has produced it has disappeared. The duration of this retinal picture is estimated at one-tenth of a second; so that, if an image is placed before our eyes ten times in a second, the idea of discontinuity is lost, and the images appear to be in continual evidence. If the images shown to us are represented in the successive positions assumed by the object in motion, the im-

pression conveyed to the eye is that of a continuous movement without intermission. If the photographs are presented to the eye at the same intervals as separate the successive exposures, the movement will appear as if it actually took place.' *

This property of the retina is termed persistence of vision, and it will be easily understood, from the clear definition given in the preceding paragraph, what bearing the phenomenon has upon animated photography. When the series of photographs is being passed across the surface upon which they are projected, the eye is receiving probably between ten and thirty impressions per second; and, although these impressions reach the retina separately, it will be understood that in consequence of the fact that each impression remains for an appreciable length of time upon the retina before it is, so to speak, obliterated by those which succeed it, the effect upon the brain is not that of a series of disconnected and independent communications, but of a continuous and persistent sensation. Hence it is that we get the phenomenon of apparent motion on the screen with which every one is now familiar.

In a valuable paper† on the Cinematograph for attaching to the lantern, to which I shall again make reference, Mr. F. C. B. Cole illustrates, or rather defines, this phenomenon of the persistence of vision in a way which those who are acquainted with electricity may particularly appreciate.

'Describing it to an electrician,' he says, 'I might speak of it as "self-induction of the optic nerve." We find several analogies to this in electrical matters; for instance, the "persistence" of the arc in an ordinary arc lamp is just the property which enables it to be run on an alternating current circuit, for the reason that in a direct current system the arc appears to exist for a short time after the current has been cut off; thus, when run on an alternating system, the arc is maintained during the period of reversal; should the period of alteration become longer than the persistence of the arc, the light fails. However, the whole thing is summed up in this, that, when an image momentarily falls upon the retina of the eye, under ordinary conditions, it gradually fades away, and an appreciable time elapses before it entirely disappears.'

I quoted above from Marey's book on *Movement*. To avoid misconception, it may be well to state that this valuable work does not dea at any length with the subject of animated photography. It is what is termed chrono-photography that has long formed an object of study and experiment with this eminent *savant*, and by its aid he has been enabled to obtain much valuable photographic information relating to the analysis of movement of animals, fish, insects, human beings,

* *Movement*. By E. J. Marey. 1895. (P. 305). Published by William Heinemann, Bedford-street, Strand.

† Journal of the Camera Club, March, 1897.

quadrupeds, &c. But the synthetic reconstruction of those movements is obviously of secondary importance to the analysis of the various methods of locomotion, with which M. Marey has almost entirely occupied himself, so that the book lies somewhat outside the scope of animated photography. Nevertheless, the two branches of work parallelise at times, so that it is difficult for anybody who is interested in the photographic reproduction of the curves and positions taken by animals and moving bodies in their progression to be wholly indifferent to the purely pictorial side of the subject which animated photography clearly is. M. Marey's book, aside of these considerations, is a masterly treatise on the subject of the analysis of movement, and well deserves studying for itself.

II.—HISTORICAL NOTES.

The history of animated photography may be said to begin with the enunciation of the principles of the persistence of vision, about 100 years ago by Plateau who put those principles into practice by the production of an instrument termed the Phenakistoscope. This consisted of a cardboard disc perforated at equal distances round the periphery by small slits. One side of the disc was blackened, and on the others a series of images were arranged representing men or animals in the various attitudes which corresponded to the successive stages of movement. When the disc was spun round on its axis opposite to a mirror and the eye applied to the blackened side on a level with the revolving slits, the reflections of the various images were seen one after another corresponding to the different attitudes assumed by the original object; thus conveying the impression of actual movement*. It is worthy of note that, as early as a century ago, we have a fulfilment of the essential conditions of successful animated photography—the rapid presentation to the eye of a series of successive pictures, each differing slightly from those that precede and follow it.

Plateau's instrument was, of course, improved upon in detail, but its principle has never wholly been departed from. Typical of the various adaptations to which it gave rise may be mentioned the well-known Zoetrope, or wheel of life (introduced about 1845), which still survives, and is capable of affording endless amusement in the family circle, and to young people. The Zoetrope consisted of a cylindrical chamber revolving on a vertical axis. Narrow upright slits were made round the brim, and inside the cylindrical wall a strip of paper was pasted, a series of images depicting the successive attitudes of a figure in motion. The cylinder being revolved, and the eye being placed axially to the slits, the impression of movement was, of course, obtained.

I am reminded by a friend that recently there was an article in the *Photographische Correspondenz*, by R. J. Sachers, of New York, on the

* Marey, p. 307.

projection of consecutive pictures. He points out that Captain Franz von Uchatius was the first to produce moving pictures in such a manner that a large number of people could see them simultaneously. Lieut. Field Marshal Ritter von Hauslab commissioned Captain Uchatius to endeavour to construct an instrument that would enable a number of spectators to see pictures by the Stampfer method—the stroboskopic disc. Uchatius invented such a machine, and obtained satisfactory results in 1845. He perfected his machine, and exhibited it in 1853 before the Imperial Academy of Science. The pictures were printed in transparent colours, and inserted in a wooden disc in the form of a circle, with equal intervening spaces. A second disc was provided with apertures in the form of a sector of a circle, each aperture corresponding to one of the pictures. This answered the purpose of the slits in Stampfer's disc. Both discs were mounted on the same axis, and turned by a handle. The whole was enclosed in a light-tight case, the only apertures being for the objective and the handle. When the discs were rotated, the images formed a moving picture.

Mr. Cole tells us that 'about 1869 or 1870 came the Praxinoscope, by Raynaud, an instrument which was of the same style as the Zoetrope, only the pictures were seen reflected in revolving mirrors. At this time we also hear of a Photoscope, by Mr. Talbot, in which microscopic views on glass were viewed through a lens as transparencies, and, as they rapidly succeeded each other, the effect of animation was produced; this,' he remarks, 'appears to be the first instrument of the kind to take advantage of photography.'*

On the other hand, Mr. Snowden Ward* credits Louis Ducos du Hauron, the French experimentalist in three-colour photography, with the invention in 1864, two French patents standing in his name, presumably for the photographic application of the principle, although it is not so expressly stated.

The Zoetrope and its congeners did not exhaust the non-photographic applications of the idea. Muybridge painted from his photographs of horses on to glass discs, and projected them by means of the lantern. Solid figures, too, were used in the Zoetrope, and the latter was subsequently adopted by Anschutz for reproductions of photographs, and is now sold or exhibited under the name of the Tachyscope. Muybridge and Anschutz, by their photographic studies of animal locomotion, and the exhibition by projection of the results, undoubtedly brought us appreciably nearer to the realisation of animated photography as we now know it. Muybridge, as is well known, used a series of electrically controlled cameras for recording the phases of movement of a horse passing in front of them.

It appears to have escaped notice that, at the Chester meeting of the

* *Knowledge*, September 1, 1897.

Photographic Convention of the United Kingdom, in June, 1890,* Mr. Friese-Greene introduced his camera for taking a series of photographs in rapid succession. Negatives by its agency were shown in the form of a long ribbon of celluloid impressed with a large number of negatives. The apparatus by which the pictures were to have been shown on the screen was, however, deranged, so that the audience were deprived of the opportunity of witnessing the full effects intended to be reproduced. He exhibited a camera which, he stated, would take a series of negatives at the rate of 600 per minute. He also read a paper dealing with the subject of persistence of vision, and its relation to the production and projection of animated photographs.

But the greatest impetus to animated photography was probably given by Mr. Edison, who, in 1893, produced series of photographs of moving objects on perforated strips of sensitive celluloid films, such as we are now familiar with. The positives from the negatives thus made were converted into endless bands, and these, being electrically driven, and illuminated, were viewed through a magnifying eyepiece, and, as between the eyepiece and the moving band a rotating slotted disc was interposed, which presented a new picture to the eye at each successive revolution, the observer obtained all the impressions of movement in the pictures. The Kinetoscope, as it was called, was exceedingly popular for a time, and there is no doubt that it was the immediate forerunner of the present system of viewing animated photographs on the screen, rather than as translucent films.

Probably the earliest to take advantage of Mr. Edison's obvious hint were Messrs. A. & L. Lumière,† who, on July 11, 1895, gave an exhibition of animated photographs, at the offices of the *Reveu Generale des Sciences*, in Paris, at which the evolutions of cuirassiers, a house on fire, a factory, street scenes, and a dinner party were shown on the screen, and much admired. In view of subsequent developments, it may be interesting to reproduce the brief description of Messrs. Lumière's Cinematograph as it was then given: 'The principal features are a mechanism whereby the film is at rest during illumination, and an arrangement for projecting the images upon a screen so as to be visible to a large meeting. Under these circumstances, fifteen images a second are all that is necessary. The film is at rest for two-thirds of the time of the passage of each image. During the remaining third the film is grasped and pulled forward as far as the next image by a set of teeth attached to a frame, whose motion is governed by a cam, working by a revolving handle. The same apparatus also serves for taking the photographs, and for printing transparencies from the negative film. For this

* The British Journal of Photography, vol. xxxvii., p. 423.

† The British Journal of Photography (Supplement), September 6, 1895, p. 72.

purpose two films are passed over the rollers, the negative and the film to be printed on, and exposure is made for a very short time as each negative image is placed on the field.'

On January 14, 1896, Mr. Birt Acres gave, at the Royal Photographic Society, a demonstration of what he then termed the Kinetic lantern for the projection of animated photographs.* These were taken at the rate of about forty per second, and were projected at the rate of about fifteen per second. The examples included boxers, a review at Kiel by the German Emperor, Epsom Downs, and the Derby, serpentine dancing, breaking waves, &c.

Let it be observed that, in this very brief account of the historical development of animated photography, I have eschewed all mention of Patent Office records, and have not sought to discuss the question of priority in whatever inventions animated photography may rely upon.

III.—ANIMATED PHOTOGRAPHY IN PRACTICE.

From the foregoing exposition of the general principles involved, the reader will, doubtless, easily perceive how they are applied in practice. It all comes to this, that a strip of sensitised celluloid film, varying in length as may be desired from sixty feet to hundreds of feet, and perforated at its edges, is wound down in the focus of the view lens, behind which it is held in register for a fraction of a second. The quicker the exposure is being made, the shorter the rest; but, assuming twenty pictures a second to be taken, then the pause will equal one-fortieth of a second. A rapidly moving shutter acts between the lens and the film, which is obviously obscured for a fraction of a second, during which it moves on, and another portion of the film has arrived in position on the focal plane.

In projecting the positives on to the screen exactly the same principles prevail. Each little picture is given a momentary pause behind the projecting lens, and the light is temporarily, although not appreciably, obscured by the shutter.

The Edison standard gauge film measures about 1½ in. wide, the actual dimensions of the image being about 1⅛ inch by ⅞ths of an inch, the perforations numbering four on each side of the picture; the Lumière film has the same measurements, but has only two perforations, one on each side. Some specially made cameras for taking animated photographs admit of films measuring as much as 3¼ in. wide being used, But the advantages of large pictures are not, it may be supposed, universally admitted.

The operation of taking the photographs after a little practice is an

* The British Journal of Photography, vol. xlii., January 7, 1896.

extremely simple matter. The camera is set upon a stand, which cannot be too rigid, and, the view or scene having previously been focussed, the exposure is made by winding off the film behind the lens, the rapidity of movement being, of course, governed in the same manner as with ordinary instantaneous photography—that is to say, the factors of lens aperture, speed of emulsion, and rapidity of shutter, are of equal value in the one kind of photography as in the other. The quicker the objects move, the shorter the exposure. It is well to bear in mind that, theoretically at any rate, in this class of work there is a gain in respect of depth of definition, *i.e.* the short focal length of kinematographic lenses clearly having an advantage over longer-focus lenses used in ordinary work. It must also be borne in mind that, as most Cinematograph apparatus is worked by hand, the rapidity of the exposure may be differentiated at will, so that the operator can adapt his exposures to the speed with which the objects in the field of view are moving.

I insert this elementary outline of the method by which animated photographs are taken in order that those readers who are not interested in the theoretical and historical parts of my subject may better understand the way in which the apparatus, described in the next chapter, is manipulated.

IV.—VARIOUS FORMS OF APPARATUS FOR ANIMATED PHOTOGRAPHY.

During the last two years the number of machines for taking and projecting animated photographs, that have been devised in England alone, numbers considerably over a hundred, and many others are imminent. Not only would it be out of place on my part to institute comparison between any of these machines, but it is also clear that to attempt a description of an appreciable number of them would be a somewhat heavy and monotonous task. As typical, however, of some of the varieties of mechanical means employed in the construction of apparatus designed for animated photography, I append brief descriptions of Messrs. Lumière's, Mr. Acres', and Mr. Demeny's systems. These have come under my own observation, and for that reason are perhaps fittingly selected for mention.

Messrs. Lumière's.

The band of film follows the same path, whether it be a sensitive band for making a negative or a positive band used for projection; in the latter case the back of the apparatus is removed, and a strong beam of light is thrown upon the band.

Only one description is, therefore, necessary to make both functions of the apparatus understood, either for photographing or projecting.

The band of film enclosed in B (figs. 1 and 2) is fifteen metres long

and three centimetres wide; it is perforated near both edges with equidistant holes situated at the extremity of each image; the pictures taken at intervals of one-fifteenth of a second are exactly similar, that is to say, if two pictures be superposed, those parts representing stationary objects will exactly coincide, and the parts representing moving objects

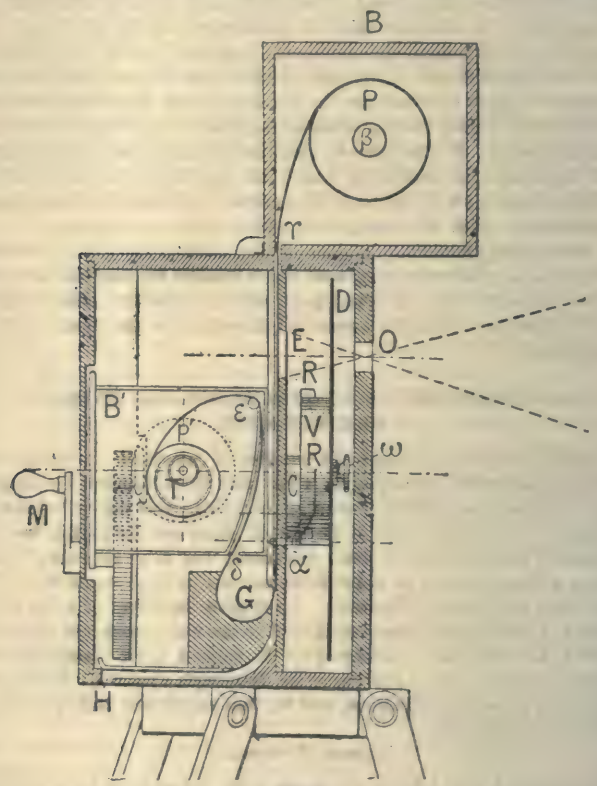


FIG. 1.

will be so situate that they represent the change that has occurred by movement in the interval between the exposures.

This band, P, rolled on a spool (figs. 1 and 2), passes through an opening, *y*, descends vertically, then passes an aperture, E, in front of the lens situated at O; thence it goes into the recess, G, to pass upwards

over a small rod, E, to be carried on to a spool, P′, rotating on the axis, T.

The handle, M, turned by hand, rotates the spool by a system of cogs, and at the same time turns the arbor, *w*, of an eccentric, C (shown alone, fig. 3), and imparts a go-and-return movement to the frame, L, vertically.

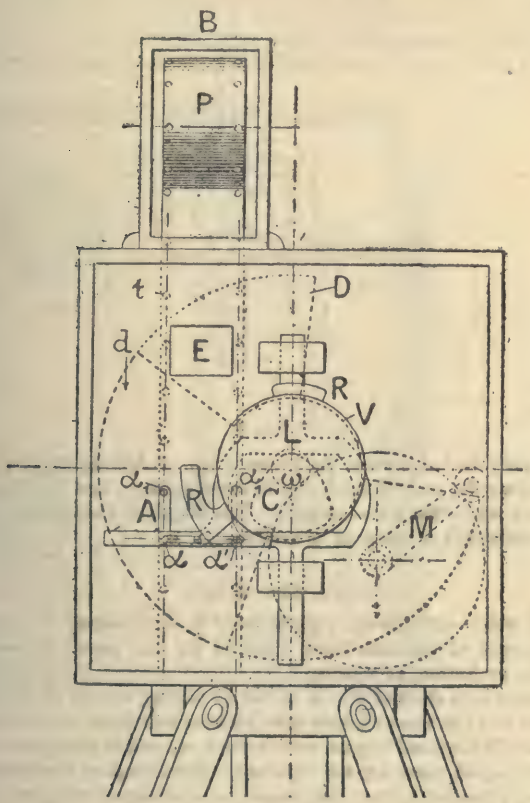


FIG. 2

From the form of this eccentric it will be seen that a regularly increasing speed is imparted to the frame, and that it decreases in like manner, and that there is a rest at each end of the track. This rest is necessary to allow two small hooks, X and A′, carried by the frame, to

pass through, and return from, the holes along the edges of the band. The hooks are attached to the springs, A and C; two inclined planes, B, upon which they slide, remove them from the film when the frame, L, is at the lower extremity of its path, and they allow them to approach and

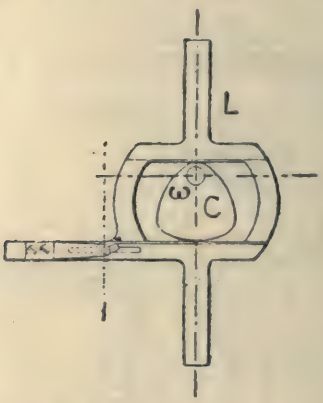


FIG. 3.

engage with the holes when the frame is up. It follows that the band is drawn along the path of the frame in equal sections, and that it remains stationary whilst the frame returns. The length of the picture is, therefore, exactly that of the path of the frame.

MR. BIRT ACRES'.

This system consists more particularly in so arranging the apparatus as to permit of the film being clamped for the period necessary for exposure, projection, or viewing.

A continuous sheet of film is drawn by feeding wheels off a roller by means of two pin wheels taking into perforations made at the edges of the film. It is caused to pass behind the lens, and is clamped there for the short period necessary for exposure. The clamping is effected by an open frame pressed against the film by a cam turned by gear from the axis of the shutter, which is turned by hand or otherwise.

During the time the film is so clamped, the pin wheels still revolving would cause undue strain on the film. This is obviated by causing the film between the clamping frame and the pin wheels to be deflected out of the straight line by a roller acted on by a spring. Whilst the film is travelling this spring deflects the film, but, whilst the film is clamped,

the spring yields, and the pin wheels continuing to revolve take up the slack. Immediately the clamp is released the spring again acts on the roller, causing the film to be deflected as before. The film is then wound on to a second roller.

A is the objective tube, behind which is mounted the disc shutter, *f*, which is caused to revolve by hand or otherwise, driving by any suitable gear a cam, *e*, and pin wheels, *c* c^1, over which passes the continuous film, *a*, drawn from one spring roller, *b*, and wound on another, b^1.

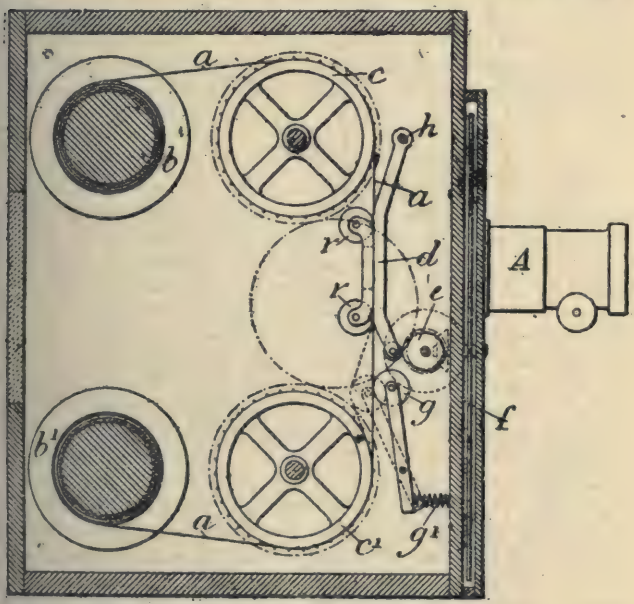


FIG. 4.

The film passes between a pair of rollers, *r*, and the face of a lever, *d*, which is pivoted at *h*, and is alternately pressed by the cam, *e*, against the film clamping it and holding it stationary, and releasing it so as to allow it to move onwards. The pin wheels, *c* c^1, which are geared together, are so set in the first instance as to leave between them a certain amount of slack of the film, which is taken up by the roller, *g*, urged by a spring, g^1, causing a bend of the film. As the wheels go on while the film is clamped, the wheel, *c*, delivers slack, and the roller, *g*, yields, allowing the wheel, c^1, to take up the slack of the bend.

The Demeny Chrono-photograph.

The Demeny instrument takes and projects pictures, each of which gives an image having an area four times greater than animated photographs of the usual size.

The illustration shows the band of pictures in process of being wound off.

The bobbin upon which the pellicular band has been previously rolled by the aid of a winder is placed upon a fixed axis, and a friction roller

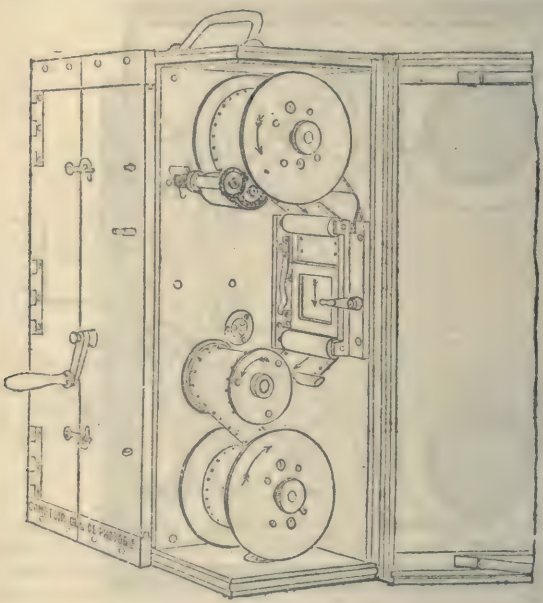


Fig. 5.

drawer composed of a cylinder covered with an indiarubber casing and driven by a gearing placed in the interior of the apparatus, unrolls a given quantity of the pellicular band. This portion of the band engages itself between a guide and a friction roller along a passage lined with velvet, in which is found a rubber frame placed opposite the window, and presenting an identical aperture to that forming the opening of this window.

This rubber frame, lined with with velvet, is movable round a joint

adapted to one of its sides, and, when the film has passed, the frame is applied upon it, and it keeps it in gentle and continuous pressure by clasping in the spring wedge.

After having passed under the frame, the film engages itself *under* a friction roller, then also under a cam, then it is passed *upon* the dented cylinder, wherefrom it finally rolls itself upon the receptor bobbin previously placed upon the drawing axis.

The descriptions of the three instruments here referred to may not apply in all respects to the very latest productions of their respective makers, inasmuch as improvements are constantly being made in this kind of apparatus, but in the main they are probably correct. In the section of this ALMANAC which is devoted to 'Recent Novelties in Apparatus' other cameras for animated photography are also mentioned.

V.—THE BIOGRAPH.

Considerable success in this country has attended the exhibition of animated photographs, on a larger scale than usual, by the Biograph, the invention of an American, Mr. Casler. There are certain features about the method of obtaining and projecting the photographs with this machine that are sure to be interesting, and I therefore give the following particulars, for which I am indebted to an article in the *Scientific American*, here much condensed: The camera frame is mounted by means of three adjustable legs upon a triangular turn-table, which may be placed upon any suitable support. Upon the top of the frame is bolted a two-horse-power electric motor, which is driven by a set of storage batteries. The combination of the turn-table with the vertical adjustment before mentioned enables the camera to be shifted so as to take in the required field. In the front end of the camera is fixed a lens, capable of gathering a great flood of light and producing an image of exceedingly clear detail. Above this lens, on the front face of the camera, is fixed a finder, which gives the same sized image as the main lens. Inside the camera is a strip of film two and three-quarter inches wide, and about 160 feet in length which is wound upon a small pulley or drum. The length of the film varies for different subjects, and, in the case of a prolonged scene, it may extend to several thousands of feet.

The film is led through a series of rollers and caused to pass directly behind the lens of the camera, and finally is wound upon a second drum. The object of the rollers is to cause the film to pass behind the lens with an intermittent instead of a continuous motion. At ordinary speeds this would seem to be a matter of simple accomplishment; but, when we remember that impressions are taken at the rate of forty a second, and that the film, which is running at the

rate of from seven to eight feet a second, has to be stopped and started with equal frequency, it can be understood that the problem was no easy

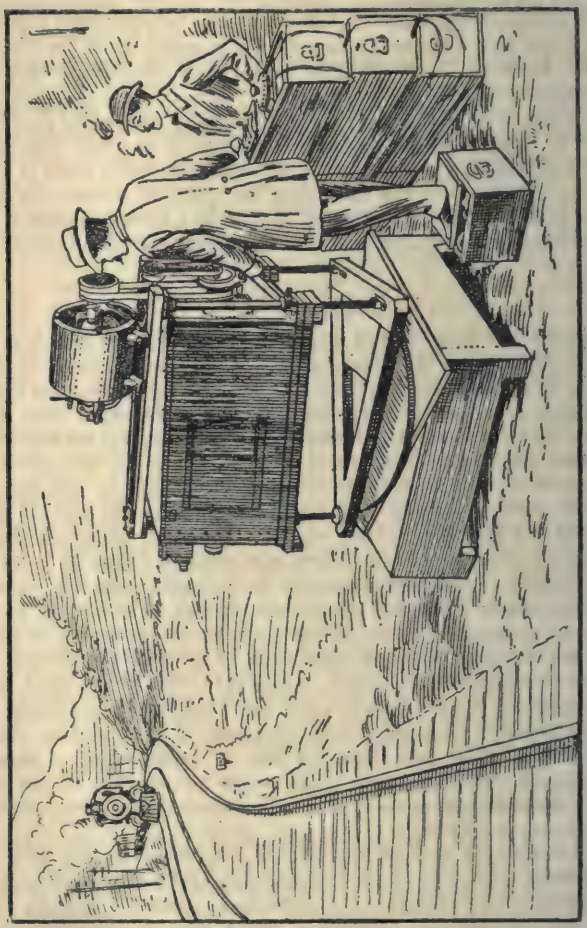


Fig. 6.

one to solve. The film comes to a rest as the shutter opens, a phase or image is deposited, and the film starts again as the shutter closes. The impressions vary in actual exposure between one-hundredth and one

four-hundredth of a second. While the ordinary speed is forty a second, the Biograph can take equally good pictures at the rate of one hundred per second if it is necessary. The higher speed would be used in photographing the flight of a projectile or any object that was in extremely rapid motion.

The mechanism within the cabinet is driven by belting from the motor above mentioned, and the speed of the motor is controlled with great nicety by means of a resistance box, which is shown in the engraving mounted upon the storage batteries. The apparatus is represented (fig. 6) in the act of photographing the 'Pennsylvania Limited' while it was running at the rate of about sixty mile an hour. The Biograph is set up at the side of the tracks upon a solid platform; the stretch of track is properly focussed by the operator, and at the moment that the train comes into sight the current is turned on, the speed being regulated through the resistance box, as explained. By the time the last car of the train has flashed by, 160 feet of film has streamed past the lens, received its 1000 impressions, and been wound with its precious record upon the receiving spool.

The Biograph for projection purposes is similar in its general appearance and construction to the apparatus for taking the photographs. There is a similar arrangement of rollers and mechanism for controlling the movement of the film, and the machine is driven, as before, by an electric motor, and controlled by a resistance box. The chief difference observable in the interior of the Biograph for projection, as compared with the camera, is that the former contains a hand-regulated arc lamp of 5000 candle power, which is placed behind the lens. When a subject is to be thrown upon the screen, a spool containing the positive film is placed in the cabinet, and run with an intermittent motion through the controlling rollers, down between the lamp and the lens, and finally wound upon a receiving spool. In order to ensure that the best effect shall be secured, it is necessary to run the film at the same speed at which it was taken—a result which is obtained by the use of a tachometer. The whole apparatus and the operator are enclosed in a cabinet which is located at the back of the entertainment hall, above the heads of the audience. A hole is cut in the cabinet for the lens, and there is a window for the operator.

VI.—DEVELOPMENT.

Upon the subject of the development of the negative and positive films it is hardly necessary to speak in detail. A reference to Chapter III. shows how, in the Lumière system, the camera used for taking the negatives is also employed for exposing them in contact with the film upon which the positive is made.

A somewhat more elaborate system for employment on a large scale

is due to Mr. Jenkins, of New York, whose method is described in the *Scientific American*.

It consists of reels supported on suitable upright standards holding respectively the sensitive ribbon film and the negative film. The film from the negative supply reel is carried along over the sensitive film reel, and both pass in contact, in continuous motion, under an exposing chamber illuminated by white light, either incandescent electric light or a Welsbach gas light, thence over the toothed sprocket driving wheel to the winding reels, the exposed film being wound first. It will be noticed that the reels are interchangeable, hence, to make duplicate copies, it is

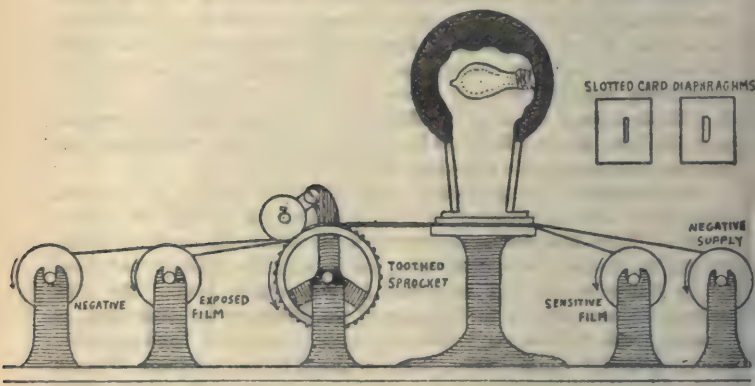


Fig. 7.—Ribbon photography—diagram of the printing device.

only necessary to remove the negative spool from the winding-up end to the supply spool standard of the apparatus and begin over again. The perforations in the edges of the film are of specially square shape, and give the square sprocket teeth of the propelling pulley a better pull on the film. The teeth pass through the perforations of both films, causing both to move exactly the same, and at all times to keep in perfect register. The speed of the film, passing under the exposing chamber, must be uniform, and this is obtained by propelling the sprocket wheel by an electric motor or by a spring motor. The electric motor is behind the light chamber. The axle of the motor has worm gear operating a cog wheel on the main shaft. A V-shaped elastic band holds the frame (in which is a ground glass) in contact with the films, producing a sort of tension on the film. To the left of the light chamber is a supplementary tension, adjusted by screw nuts.

Referring to the above illustration, there will be seen two slotted

diaphragm cards. These are placed over the ground glass just mentioned, at the bottom of the light chamber, and are for the purpose of regulating the amount of light that acts on the negative. If the negative film, as a whole, should be thin, then the card with the narrow slot is used, which allows a shorter exposure to be made, as the negative and film are passed under it. If the negative is full of density, then the narrow card is removed and the wider-slotted card substituted, which allows a larger volume of light to act upon the negative film. The exposed film is wound around large open reels from its spool, and developed by passing through troughs of developer solutions.

The necessity of providing apparatus to quickly reproduce positive impressions from the negative ribbon films is one of the reasons why this simple device was invented, and its novelty consists in the fact that the film moves continuously under a uniform source of light without any intermittent motion or the use of shutters.

Whatever the mechanical details of the particular system of printing employed may be, it is obvious that the main principle of passing the negative and the positive film in intimate contact before a constant light at a uniform rate of speed cannot be departed from in practice.

The actual method of development of negative and positive is extremely simple. I believe that the plan mostly favoured is to wind the film round a revolving drum, which passes through the developing solution. The only plan I have actually seen in operation is that adopted by Mr. Birt Acres. He uses a rectangular frame, the top and bottom bars of which each have a row of small wooden beads. The film is wound taut round this frame, the wooden beads engaging in the perforations. The ends of the film being secured to the frame, the whole thing is placed in a vertical bath containing the developer, and is fixed and washed in similar vessels. This appears to be a simple and economical way of working, especially on a small scale.

VII.—SOME DEFECTS OF ANIMATED PHOTOGRAPHS.

Bearing in mind that the exigencies of projecting animated photographs frequently demand their magnification by hundreds of diameters, the prominent appearance of light and dark streaks, splashes and lines in the pictures can hardly be wondered at. Apparently we are far from the time when these pictures will have all the purity and brilliancy of a first-class lantern transparency; but there are distinct signs of improvement, and it may be conjectured that, when the photography of the subject receives a little more attention in detail, marked advances in the technical qualities will be made.

The chief defect, however, from which projected animated photographs suffer is the 'flicker' of the image on the screen. Numerous are

the theories put forward to account for this unmistakeable drawback. The alternation of light and shadow caused by the use of the shutter; the inaccurate perforation of the film and its consequent inability to engage in the sprockets; non-registration of the pictures as they pass the projecting lens and unsteadiness of the apparatus in taking and showing the pictures are among the explanations advanced.

There are many ingenious mechanicians at work to overcome this defect; but it is as well not to be too sanguine that the much-needed improvement will be universally realised very quickly. I do not exaggerate in saying that, during the last year, I have been made the recipient of the confidences of at least a dozen persons who have brought the Kinematograph to perfection; some of the machines have not yet seen the light, others have, but they have fallen short of expectations.

There is another point which it is permissible to suggest should receive greater attention, and that is the use of the lens under such conditions as will ensure the very highest degree of definition in the negative. The objective usually employed for the purpose is one of the portrait type, working at an aperture of *f*-3 approximately, with a focus of about 2½ inches. The covering power of the lens is obviously more than equal to the requirements demanded of it; but a little care in the selection of a lens giving the best obtainable definition is not thrown away.

With the exception of a Biograph noticed in a previous chapter, which is actuated by an electric motor, hand power is exerted in taking and projecting the pictures, and, on the whole, is most suitable, as the convenience of differentiation of speed is obtained.

For the purpose of minimising the visibility of the flicker, Mons. Gaumont, of Paris, has introduced a little instrument which he calls La Grille. It resembles in construction a fan, the upper portion of which has a series of transparent openings through which the spectator looks at the pictures on the screen.

So far the use of a shutter in taking and projecting is generally recognised. Mr. Jenkins, however, whom I have already quoted, considers that to use a shutter is a detriment, as it causes an enormous loss of illumination—in the Kinetoscope over 300 per cent. [probably seventy-five per cent. is meant.—ED.]; and to move any part of the mechanism intermittently is prohibitory in devices intended to move so rapidly as is necessary in this class of apparatus, viz., 1800 repetitions per minute.

He claims to have devised an apparatus which dispenses with a shutter—a direction in which several English inventors have been working, with what success I do not know. Attempts have also been made to avoid giving the film an intermittent motion; but the results, I believe, are not satisfactory, the continuous movement of the ribbon giving

the pictures what is known as a 'rainy' effect. This applies to projection, and presumably, in taking the photographs on continuously moving films the same defect would characterise the negative. Theory demands intermittent motion, as without it is difficult to conceive that a series of distinct and disconnected photographs can be presented to the retina.

VIII.—VIEWING ANIMATED PHOTOGRAPHS IN BOOK FORM.

One of the inevitable developments of animated photography is that the pictures should be reproduced on paper in book form, and the effect of motion obtained by viewing them as they are rapidly pressed forward one after another by the pressure of the finger. This idea has been availed of for selling penny books of 'living photographs' as toys,

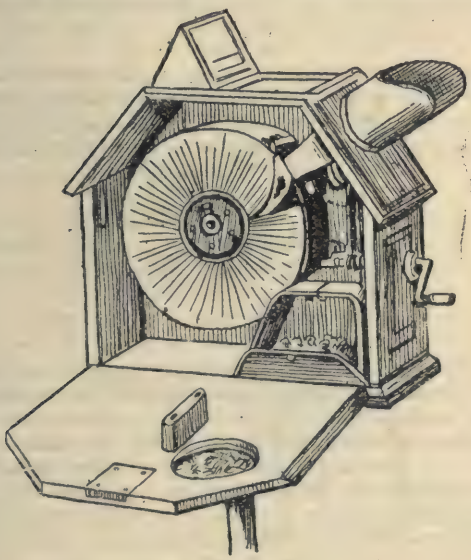


Fig. 8.

obviously suggested by the little books of drawn figures which were popular thirty years ago. More elaborate and useful is the device for enclosing a book of enlarged photographs in a cabinet with an eyepiece through which, as the photographs are released by pressure, the full effect of movement may be obtained. I append descriptions of two inventions

for this purpose, the one, the Mutoscope,* by Mr. Casler, of New York; the other, the Kinora, by Messrs. Lumière. The latter, it will be observed, is adaptable for 'automatic' use, a phase of animated photography that is practically a revival of the Kinetoscope.

The Mutoscope (fig. 8).

In this machine the bulk, the complicated mechanism, and the motor of the Biograph are replaced by a simple, box-like apparatus, no larger than the cover of a sewing machine. The enlarged pictures, six by four inches in height, are mounted in close consecutive order around a cylinder, and stand out like the leaves of a book. Each picture is momentarily held in front of the lens by the action of a stop attached to the roof of the box, which allows the pictures to slip by in much the same way as the thumb is used upon the leaves of a book.

The Kinora.

The pictures are cemented on cards, M, or other elastic opaque supports, to which a curved form is given, the picture occupying the concave side. These cards are then mounted in the order of succession of the pictures on a shaft, A, around which they radiate in every direc-

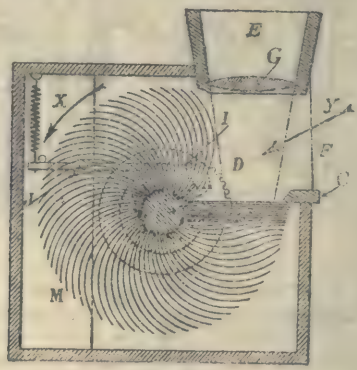


Fig. 9.

tion, being firmly fixed at their base by the pressure of two discs, BB, or by other suitable arrangement.

If the wheel thus formed is caused to turn in the direction of the arrow, X (fig. 9), and at the same time a stop, C, entering slightly the circumference of the wheel, is fixed slightly above the centre, the cards detained by the stop will be straightened out, and become flat and nearly

* *Scientific American.*

radial, as shown in fig. 10, at the same time leaving an empty segment, D.

The rotary motion continuing, the cards thus stopped will escape one after the other at regular intervals, and will rapidly traverse the empty segment, again assuming their original curved form consequent on their elasticity. The distance to which the stop, C, enters is regulated so that the empty segment, D, shall allow the picture on the last detained card to be viewed through the opening, E, which picture is illuminated by daylight or by artificial light entering in the direction of the arrow, Y, through the side opening, F, of the box containing the apparatus.

The observer, looking through the opening, E, will therefore see successively the pictures in a state of complete rest, the successive visions being separated from each other only by the exceedingly small space of time occupied by a card traversing the segment, D. Inasmuch

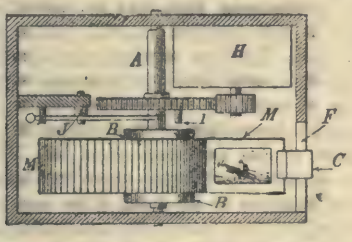


FIG. 10.

as the edge of the card, which is escaping from the stop, C, cannot exactly coincide with the edge of the next card to be detained, the stop, C, can be lowered near to the line passing through the centre of the shaft, A, so as to render this difference so slight that the eye can perceive no lateral movement in the succession of the two pictures.

The back of each card as also the parts not covered by the picture are blackened, in order to avoid all radiation of light during its passage across the field of vision. The opening, E, can be provided with a lens, G, to magnify the pictures, and with any other known arrangement for assisting observation.

The wheel might be formed of flat cards radiating from the centre of the shaft, A, but in such case the stop, C, would curve the pictures at the moment of vision; this is why it is preferred to curve the cards previously, in order that they may be presented flat during observation.

As the wheel makes only one revolution, or part of a revolution, during

the viewing of a scene, it moves at a very moderate speed; it can be put in motion by hand, by intermediate gearing, or, better, by a spring motor placed at H (fig 10).

It will be easy to stop the motor at the end of a scene by means of a stop, J, in position to act against one or several pins, I, conveniently placed on a wheel carried by the shaft, A.

The wheel will be again set in motion by raising the stop, J, which will give a renewed exhibition of the same scene, or will exhibit the following scene on the same wheel. This arrangement enables the apparatus to be readily rendered automatic by the introduction of a piece of money into the box, which piece, having only to liberate the mechanism, stops of itself at the end of the scene.

IX.—STEREOSCOPIC ANIMATED PHOTOGRAPHS.

Whether it is feasible to realise the dream of some inventors to project animated photographs that may be viewed stereoscopically is hard to say; but it has escaped general notice that the veteran mechanician, Mr. F. H. Wenham, to whom photography is under many a recognised obligation, some time ago* narrated some experiments he made, with the idea of imparting stereoscopic relief to Zoetropic pictures. Here is Mr. Wenham's description of his experiments:—

'The description of the arrangement of Mr. Edison calls to my recollection some experiments in this direction made by myself in the year 1852. It then occurred to me that, if the series of figures in the Zoetrope, or wheel of life, were taken photographically and duplicated as in the stereoscope, and both series viewed simultaneously with each eye, that, instead of a mere flat moving diagram, we should obtain the effect of a solid figure in motion. Accordingly, two large circular millboard discs were mounted on spindles rotated in opposite directions by means of a crossed band of common clock chain running on spiked pulleys on the spindles. The next step was to take the photographs. This, being the early days of the collodion process, was a tedious operation, as from eight to ten seconds were required for each exposure. The camera used was a stereoscopic one, giving two pictures simultaneously. Ten pairs of negatives were taken, from which twenty prints were obtained. Ten of these were mounted at equal distances on each of the flat discs for the commencing half of the movement of the figure, and the corresponding ten of the receding one, so that there were twenty pictures on each disc, the first starting from zero, and the last again reverting to the first. In each of the intervals between the pictures a slit was cut for securing a momentary vision of each, and the whole was rotated with the pictures well lighted and facing a looking-glass. The subject selected was a little

* *English Mechanic*, June 7, 1895.

man with a head so bald that it was aptly compared to a bladder of lard; he was seated in a chair in sunlight. Before him was placed a garden vase to represent a mortar; a pestle was extemporised. At the end of this was nailed a lath about fifteen inches long, marked off in ten divisions. In the first position our sitter rested the end of this lath on the bottom of the mortar; a pair of stereoscopic pictures were then taken. Next, one-tenth was sawn off the end of the lath for another picture, and so on through the ten divisions. The finished prints were then carefully spaced and mounted on the two discs. On rotating these before the looking-glass, the effect was extremely grotesque. The whole of the little man's body, while frantically pounding in the mortar, was in a state of quivering and violent motion, and his bald, shining head bobbing up and down gave the whole display such a ludicrous effect as invariably to elicit roars of laughter, and the astonished sitter remarked, 'I never worked like that.' Another set of stereoscopic pictures were produced on a larger scale. A hand saw was marked off in divisions, and side-view pictures on each, of a carpenter sawing a deal on a stool, were taken. This was intended for a public exhibition, but circumstances prevented the arrangement from being completed; and, after all, unless the pictures are very numerous, there is the usual tremulous motion common to all zoetropes, and the subject is scarcely one of much scientific interest. The converse of this is to take a portrait, while the sensitised plate is moved uniformly from a radius during the time of exposure. The result is a horrible smear, having no recognisable likeness; but, if a print from this picture—or, better still, any number of them—is mounted on a rotating disc of similar radius, and, while in rotation, viewed through a small aperture, the effect of the motion is to foreshorten the picture in the direction of the transit, and reproduce it in due proportion.'

I reproduce Mr. Wenham's observations because some aspiring inventor may derive from them a hint as to the point from which the problem of stereoscopic animated photography may be attacked. To me, however, the extract is chiefly interesting from the fact that, over forty-five years ago, Mr. Wenham appears to have attempted the adaptation of photography to zoetropy, and that to him belongs whatever credit may be due for being the first to suggest the combination.

X.—CONCLUSION.

I am obliged, by exigencies of space, not only to leave several branches of my subject without mention, but to confine my remarks within narrow limits; hence I trust the reader will forgive the somewhat fragmentary nature of these chapters.

As I remarked at the outset, this branch of photography is probably still in the very early stages of development. It has not been altogether

in favour of its progress and perfection that its adaptability for entertainment purposes forced animated photography, practically at its birth, into the hands of those who supply the public with amusement. The sudden demand for films and projection apparatus was not favourable to the production of the best photographs and the means wherewith to make them, and the consequence obviously was, that innumerable pictures were shown all over the country which had many defects.

The problem of providing a noiseless camera and projector, which does not destroy the film at its perforation, and abolishes vibration and flicker in the projected images, is one with which, in all probability, only a highly skilled mechanician can cope. I do not despair of seeing some of the apparatus extant at the present moment (November) much improved upon, and the most cogent reason for my optimism in this regard is that there is just now the keenest competition going on among many skilled mechanical engineers and others to secure a degree of perfection in the working parts of apparatus for animated photography such as has not hitherto been achieved.

Finally, it appears to me this branch of photography is destined to have something more than a transient existence, and that, as an adjunct to the optical lantern, as a means of preserving records of scenes and occurrences, and for scientific and entertaining purposes, we have only just commenced to tap its possibilities.

ON COPYING PHOTOGRAPHS.

By G. Watmough Webster, F.C.S., F.R.P.S.

It is just about a quarter of a century since I contributed to the pages of The British Journal of Photography a description of a simple stand or table I had devised for that occasional work that falls to the lot of most professional photographers—the copying or enlarging of old photographs—daguerreotype, glass positive, or paper print. Since then the stand has passed through many stages, and many friends who saw it at the Convention time asked me to send to the Journal a fresh description of the improved pattern, as it seemed to supply a 'long-felt want.' Perhaps I shall do so soon, but at present I want to talk about processes rather than apparatus.

This sort of copying that I am alluding to often forms a very important part of a photographer's income; it is always these 'cheap things, taken for a joke,' at some travelling booth or other such humble studio, that become treasures of untold value, and from which sorrowing relatives wish to have large pictures executed. Then, again, for manufacturing purposes, it often happens that some particular picture has to be reproduced, and there is no negative available; or some engraving, say, has to be copied, and so on; there are a hundred occasions, each with a different motive, but each calling for a good copy. As a matter of course, all self-respecting photographers who have been working for so long a period as I named a moment ago, will say there is nothing like collodion for copying; and, judging by the feeble results obtained by the average 'pro.' when working with ordinary dry plates, the dictum would seem to be justified. I used to say the same thing myself, and silver bath and collodion are up to the present time always available in my enlarging-rooom; but I am willing to own up that I do not always use it for the purpose. We professionals used to smile in a benevolently superior manner at the amateur and his dry plates; but he has turned the tables on us in a very complete manner. Nevertheless, for copying and enlarging, we have stuck to bath and collodion: the question is, 'Are we, even for that purpose, going to abandon it?' Well, we know the process-block maker stuck to collodion through thick and thin; but the dry-plate maker has also stuck to him. Splendid plates are now made, and the result is that many of the block makers find that, when they get to understand the special plate made for their use, they are content to abandon collodion. Similarly in the small way of such occasional work as I am speaking of, it is probable that collodion may, ere long, be quite given up. Personally, I am able to say that, at last, I find I can get results with a 'process plate' quite equal to what I should obtain with collodion; I am quite sure that my younger assistants get even better results with them than they would with collodion.

I advise my readers to try. These plates are very much slower than the ordinary portrait or even landscape plate; but they are quicker than collodion, and with the feeblest original there is not the slightest difficulty in bringing the negatives up to full printing density. And the saving of time and labour is immense.

Then, again, it is always a ticklish matter getting a wet-collodion trans-

parency by contact from an old negative, for example; but with a process plate and a gaslight there is no risk, and the whole process, including developing and fixing, is over in less than five minutes. There is one very special advantage in using these plates—the power of obtaining, through the medium of a transparency and a repeated negative, one that shall be greatly superior in printing capacity to the original. This is a most useful property, for even the most experienced of photographers must occasionally obtain a result which he feels is not up to his usual standard, but which yet he can by reproducing, with the aid of a process plate, improve out of any resemblance to the original negative.

In these columns it is desirable that articles should be brief and to the point, and so I will leave it at that. Let every photographer who uses a collodion wet plate for occasional copying work give process plates a fair trial, and attend to the printed instructions. He will be rather surprised at his first negative when compared with what he would get from an ordinary dry plate.

HOW MANY LITRES ARE THERE IN A GALLON?

By Robert H. Bow, C.E., F.R.S.E.

The description of a gallon has undergone three stages. In the first, it was declared to be so many cubic inches (231, the old wine gallon). Next, by 6 Geo. IV., c. 12, taking effect on 1st January, 1826, two (incompatible) definitions of the imperial gallon were given: it was to contain 277·274 cubic inches, and to hold ten pounds of water at 62°, weighed in air, with the barometer at 30ins.; elaborate but faulty tables, showing comparison with the French measures, &c., were given, founded on the capacity of 277·274 cubic inches. The third stage is that at present in force, in which the cubic contents in inches is not stated; the latest statute is, I believe, 41–42 Vict., chap. 49, which came into force on 1st January, 1879, it re-enacts the definition of the imperial gallon as containing ten pounds weight of water, weighed against brass weights, in air at 62° F., and with the barometer at 30″. But, unfortunately, there is added, as a third schedule, a table of metrical equivalents *uncorrected* for this definition.

Thus the number 4·54346 given of litres in the gallon is derived from dividing 277·274 by 61·0271, the cubic inches in a cubic decimetre—both of which numbers are wrong, the litre is less than a cubic decimetre—the division gives 4·543458, and this is the value printed in the British Pharmacopœia of 1885; this pretence of exactness in giving the relation to six decimals seems rather absurd when an error occurs after the second.

The litre really measures 61·0266 cubic inches, and this quantity of water, at 4° C., weighed in air against a platinum weight, with the barometer at 760m.m., weighs one kilogramme, or 15,432·35 grains; but if one litre of water at 62° be cooled down to 4° C., its weight will be rather less than 15,415·1 grains, and as a first approximation, using that value as a divisor of 10lbs., or 70,000 grains, we get 4·54102, the same value as given by Professor Rankine in 1866, from Professor Miller's data. But when the litre of water at 62° is weighed at 62°, it will be less buoyed up by the warmer air; the value of the small correction, rendered necessary

by this, depends in part on the specific gravity of the counterpoise; if that were very great, we should add nearly 0·014 grain for each cubic inch of water, or 0·854 grain in all; adding nearly three-quarters of a grain we get for the weight 15,415·83, and this gives the result 4·5408; so that we may use 4 541 as a satisfactory approximate value of the number of litres in an imperial gallon.

NOTES FOR COLLODION LANTERN-SLIDE MAKERS.

By W. B. Bolton.

A slight intensification with silver is undoubtedly the best way of finishing off a collodion emulsion lantern slide, and after fixing is the best time to do it; but the difficulty of removing the last traces of hypo renders the operation a very uncertain and risky one. Cyanide, when used of sufficient strength to remove the bromide of silver in decent time, is not altogether satisfactory, and seems to have an injurious action on the finer gradations of the alkaline-developed image, but if used in a comparatively weak form after fixing with hypo, it has no injurious action, and serves the purpose of removing the danger arising from the latter. Every slide, however clean, is brightened by an application of weak iodine, followed by cyanide, and this treatment ensures at once perfect fixation, elimination of the hypo, and safety in intensification.

Sulphocyanide of ammonium may be used instead of hypo, if care be observed, but a second bath should always be employed. Bromide of silver is very soluble in strong or comparatively strong sulphocyanide, but the proportion taken into solution rapidly falls as the strength of the solution decreases. Hence it happens, especially if the bath has been used for any time, that, on washing the plate, a portion of the silver bromide is thrown down, some being washed away, but a portion remains in the film, and is fortunately visible. If the plate be rinsed, and again treated with a fresh and clean solution of sulphocyanide, it may be taken as pretty certain that the second fixing is a complete one. It is a good plan to keep a separate clean solution of sulphocyanide, and, after first fixing and washing the plate, to pour sufficient over it to cover it well, and to return that to the general fixing stock, so as not to contaminate the other.

Silver intensification should never be resorted to directly after the use of an *old* fixing bath, whether of cyanide, hypo, or sulphocyanide. If the fixing solution is charged with silver, some portion of the metal is sure to remain in the films, or its effects will, and the inevitable result will be stains. These may be avoided by the use of clean cyanide or sulphocyanide, especially if preceded by a dose of weak iodine or hydrochloric acid.

Many amateurs object to the use of iodine on account of its expense, as well as the difficulty in dissolving it, and many prefer the ferricyanide clearing formula. This latter may answer very well where intensification is done before fixing, or as a final clearing before drying, but it is not to be recommended before intensification for the same reason that hypo is objectionable. Those, therefore, who want a cheap and efficient

clearer should use bichromate of potash and hydrochloric acid, one ounce of each in a pint of water. This may be kept as a stock solution, and a few drops of it added to a couple of drachms of water when required for use. It is, I think, superior to iodine, as the *white* veil of converted silver is more easily seen and judged. It should be used very weak and cautiously, the application being made two or three or several times alternately with the fixing solution until the effect is obtained, rather than in one operation. The final treatment should be with clean cyanide or sulphocyanide.

A 'single-solution' clearer, the action of which can be directly watched, has its undoubted advantages, but cyanide and iodine, as usually employed, is apt to be uncertain. Here bichromate of potash again proves useful, but this time in conjunction with nitric acid. If equal parts of nitric acid and bichromate be dissolved in twenty parts of water, a stock solution is obtained which can be diluted for use when wanted. The nitric acid attacks the image, forming nitrate; this the bichromate converts into chromate of silver, which is partly dissolved in the solution, and the remainder, if any, washes out. It must be used very cautiously, and the action stopped instantly the lights of the transparency are clear, or a little before. Safety lies in a weak solution.

Many, if not most, workers, now prefer their slides varnished. A very useful varnish, which does not impair the definition as spirit varnishes are apt to, is a solution of shellac in aqueous ammonia, with a little alcohol added, or perhaps some will prefer to omit the alcohol. However, I give my own formula, which consists of—

Bleached lac	1 ounce.
Strong ammonia	2 fluid ounces.
Alcohol	2 " "
Water, to make	8 " "

Powder the shellac and digest for some time with the ammonia and alcohol, then place the bottle in a vessel of hot water, and shake occasionally until dissolved; finally make up to eight ounces with water, and filter. Apply either wet or dry; if the former, pour on and off three or four times to remove the surface water.

CURVATURE OF FIELD, ASTIGMATISM, &c., OF PHOTOGRAPHIC LENSES.

By W. K. Burton.

Some couple of years or so ago I wrote a paper to the *Camera Club Journal*, in which I described a simplified method of working out curves of field and of astigmatism for photographic lenses, illustrating the paper with curves worked out for over thirty different kinds of lenses.

In your own introductory communication to last year's British Journal Photographic Almanac you made mention of the paper, stating that it ought to be better known—or something to that effect—I have not the Almanac, or any other photographic publication, to refer to here in the wilds of South Formosa, where the temperature is 97° Far. by a

thermometer on the table where I write—under the shade of a broad temple roof, and perhaps the coolest place within miles.

Of this enough, however; it is for the reading photographic public itself to decide whether it take heed of my paper or not; but there is one thing I think the *buying* photographic public might reasonably demand of opticians, and that is that they should publish, with their advertisements, curves of astigmatism and field, worked out by my own method or any other, as well as the other details, as regards aperture, &c., that they already nearly always do publish.

It may seem that this is too much to ask from opticians—that the publication of such particulars would lead to invidious comparisons—but see how much has already been done that twenty years ago would have been considered too much to expect from opticians—or, at any rate, that opticians considered it too much to volunteer.

I can very well remember when (I think I am not mistaken) *no single optician* stated even the angular aperture of his lenses without stop, or with maximum stop, but only used vague terms, such as 'extra rapidity, 'extreme rapidity,' and so forth.

I can also remember when, suggesting to one of the then—and still—leading opticians in London, that his rapid symmetricals should have a uniform maximum aperture of *f*-8, and that smaller stops should bear at least some ratio to the maximum aperture (this was before the suggestion of the universal standard). He replied that it would be simply impossible—that to face merely the correspondence that would be involved would be out of the question. Yet this very optician now gives, in his advertisements, the angular apertures of every lens he makes, and the relative angular apertures or areas of smaller stops. So, in fact, now do all opticians of real eminence, whilst one publishes an elaborate table—a copy of which is pasted to the wall of the room where I do my printing, keep my cameras, lenses, &c.—of the angular aperture of every stop of every lens that he manufactures.

Then, again, what an improvement there has been in the matter of giving us information of the field angle. We used to have vague statements about 'extraordinary wide angle,' 'angle of over 100°,' &c., some not only vague, but wild. Now we quite commonly have of any given lens a statement of the size of plate it will cover with different stops, and finally a statement of the 'circle illuminated' with a 'small stop.' The only defect in connexion with the last-mentioned statement is that it is not generally made clear whether the 'circle illuminated' is that of the utmost limit—that which would be illuminated by a stop of indefinitely small size, or that fully illuminated with the smallest stop actually supplied with the lens. Fully illuminated in the sense that the pencils are not cut down by the mounting of the lens, but are limited by the diaphragm only.

Further still, we now have accurate illustrations of lenses, showing not only the outside form, but showing one half in section. All this information, which the opticians denied us ten to twenty years ago—perhaps from fear of odious comparison—is now freely published; and why not curves of field and of astigmatism? I should think that those firms who turn out lenses most free from these defects would be proud of publishing the curves I suggest, which might conveniently be placed above or below the illustrations of the lenses themselves.

I have nothing to say against the illustrations without the curves, except that they do not give all the information we want. The illustrations give an accurate idea of the general forms of lenses, and of the equality, or want of it, of illumination, and a rough idea of the weight of the instrument; but even the best optical mathematician could not work out further properties of the lenses without information as to the refracting and dispersing properties of each piece of glass used, and then only with much labour.

It may be argued that the average photographer has, even in these days, but a vague idea of the meaning of such terms as 'angular aperture,' 'flatness of field,' 'depth of focus,' &c., that 'astigmatism' conveys nothing definite at all to his mind, and that 'curve of astigmatism' is mere Greek to him. I think this is very far from being the case with the average photographer of the present day, though there are certainly some still sunk in the state of ignorance indicated above. Surely, however, the majority of photographers, who would gain very definite information from curves of the kind described, should not be deprived of the information they wish for the sake of these few ignorami.

VEIL *VERSUS* CLEAR GLASS IN HIGH LIGHTS.

By E. Dockree.

It is frequently stated by those who should know better, when giving a demonstration on lantern slide making, that a perfect slide or a lantern picture nearing perfection should possess 'absolutely clear glass in the high lights;' are these demonstrators really in earnest when they make such a statement? is such a conclusion arrived at by experience?

If they have never done so, and the result is to be brought home to them rather forcibly, it is suggested that a slide be made from the same negative, allowing during development a thin veiling to creep over the picture; project, when finished, the same on to the screen, then try with one possessing clear glass in the high lights, the difference will be most marked, and such information (?) will not emanate again from their lips. Many have never tried this experiment of comparison, or such an assertion they would never make; although, if consideration is given to the matter at all, it stands to reason that, from whatever point of view it is looked at, 'atmosphere' is an abstract quality to be realised by some of the faculties, even though it be in a picture that is being considered.

To make a slide with the said 'high lights' consisting of clear glass, means 'pluck' or 'vim' in the view, but is this a quality always desirable? In very many cases decidedly not; to render a view, &c., thus, shows only too apparently the absence of ordinary aerial qualities, the whole subject having the appearance of existing either in a 'vacuum' or 'rarified air,' neither of which, as far as the camera, &c., has as yet ascertained, exists within many thousands of yards above the earth.

Nature, we are taught, abhors a vacuum, and consequently those endeavouring to render the 'beautiful in nature' in the form of photographic prints on glass should also try to render that soft atmospheric effect always to be appreciated, be it sunshine, gloom, mist, or fog.

Very many slide workers choose or make the wrong class of negative from which to make lantern slides; that giving a good platinum print is the sort to also give a slide in which atmosphere will be self-evident; whereas the 'dense, plucky, full-of-sparkle' negative, so generally admired by the beginner, is the one to give the 'clear glass' result. 'Soft and vigorous' is the quality which should be striven after in negatives intended to make slides from, and should the thin veiling creep over the slide, retain it by all means; be not tempted to fly to the ferridcyanide of potassium and hypo to get rid of it.

We live in atmosphere, and we breathe; let us, by means of the things at our command, render Nature as she is, not pass by as non-existent such a quality as 'atmospheric presence.'

BORING AND TURNING GLASS.

By Procella.

Reference is made in a recent number of the Journal to the very old use of turpentine for lubricating the drill or turning tool when either boring or turning glass. Although turpentine is probably one of the best substances for this purpose, owing to its extreme limpidity, yet it is not at all necessary for the purpose.

I have on more than one occasion bored a hole through a broken glass stopper with only olive oil for the lubricant, the only thing necessary being to watch that the drill did not become dry at the point, which it is more apt to do sooner than with a substance like turpentine. A rat-tail file, turned the wrong way in the hole, at once shivers the stopper into fragments, and the pieces are easily taken out; but, while turpentine is one of the best liquids for the above purpose, I believe it is not generally known that there is another, quite as good, if not even better, for the purpose, and one which is more easily accessible to everyone, and that is paraffin oil. I mention this substance because I have found very few practical men have thought of trying it.

A DEVICE FOR HOLDING PAPER WHEN ENLARGING.

By Arthur Payne, F.C.S.

Recently I saw a very neat arrangement, a kind of frame, for holding bromide, or other paper, whilst enlarging; and, as it struck me as being both practical and complete, I thought that it would be a good wriukle for the Almanac. The frame that I saw was made in cardboard, but I think that it would be better if made of wood. The wood that is sold, ready planed, for fretwork would be the very thing to use, and, if the grain was set to run in the opposite direction when making the frame, it would prevent the work from warping. We will suppose that the frame is to take paper 12 x 10.

Procure two pieces of fretwood, each piece to be 17 inches by 15 inches, and another piece 15 inches by 17 inches, that will give the grain running across the piece instead of lengthwise. In the middle o

one piece cut a square hole, making it 11½ inches by 9½ inches; in another piece cut a square hole 12 inches by 10 inches; and in the third piece make the opening 14 inches by 12 inches. Fasten these three pieces together so as to form a frame, having a section similar to that shown in the sketch, A, taking care that the pieces are so arranged that the grain of the wood runs in opposite directions.

To form the back or lid, procure another piece of similar wood, 14 inches by 12 inches, and a piece 10 inches by 12 inches, and fasten the smaller of the two in the middle of the larger piece, either by screws or glue, again being careful that the grain of the wood runs in opposite directions. The sketch, B, shows a section of the back when finished.

Four wooden turn-buttons, shown at C, are required; the size of these ought to be about 1½ inches by ⅝ inch by ⅜ inch: they will require



a countersunk hole at one end. These are fastened by screws on to the frame, A, one at each side, as shown in the sketch, and are used to hold the back, B, in its place.

When in use, a sheet of bromide paper, 12 × 10, is placed in the frame; the back is then put in and fastened in its place by means of the turn-buckles, C.

The utility of this arrangement lies in the ease with which the bromide paper may be put into its place and removed. By mounting this frame at one end of a baseboard and the enlarging lantern at the other end, once the correct focus is obtained for a particular negative, enlarging may be carried on as quickly as the paper can be put into the frame, exposed, removed, and replaced by another piece of paper.

It will be readily seen that this frame may be constructed to take any size of paper, and, by a little elaboration, it could be so made that, by using various-sized carriers, the same frame would do for any size of paper.

MOUNTING.

By W. HANSON.

THE boiling starch, which was in general use about thirty or forty years ago, was an excellent medium for mounting all sizes of photographs with, if made suitably thinner for the larger pictures. It stuck well, and was clean, handy, and easy to work. Moreover, it kept better and longer than the starches now on the market. Perhaps the best substitute for this now lost article is 'Brown and Polson's patent corn flour,' which was recommended for this purpose some years ago by a worker, whose name I do not now remember.

NEGATIVES AND HOW TO MAKE THEM.

By F. Dunsterville.

I think it will be found that, in nearly the whole of the instructions issued by the various manufacturers with their gelatine plates, the only information given as to development is with reference to correct exposures, and perhaps certain modifications necessary in case the plates turned out to be over or under-exposed.

Not one of the plate-makers whose manufacture I have tried (and this includes all the English and some foreign plates) appears to think it in the least necessary to go into details as to modes of development requisite for the production of certain classes of negative for the different printing or enlarging processes, or to give modifications of the standard developer to meet the varying subjects of which we desire to make pictures.

A novice would naturally think that, no matter what the subject may be—a white house in the midst of a lot of dark trees or a bit of open, flat landscape—he must needs make up his developer with exactly the same proportions of pyro, ammonia, and bromide. It would never occur to him that each particular picture would require the several proportions to be increased or diminished.

It is very evident that it would be impossible to give in any reasonable space the necessary details for the innumerable makes of gelatine plates, and I propose therefore to limit myself to the one kind of plate that I have always found most suitable for all climates. I allude to Wratten's Instantaneous. These, I think, come first as existing makes of plates, at any rate in seniority. I brought some out with me in 1878 to India, and still use them regularly, especially when I am going on a tour of 5000 miles or so with twenty dozen plates that have to be exposed on the journey and developed three or four months afterwards two or three thousand miles from the place where they were exposed.

These plates develop well without ice, except perhaps when the thermometer is over 90° in the shade, and then iced water for the developer and fixer is necessary. Some makes of plates, even with iced developers and strong formalin, melt when the air temperature is over 90°.

There are many other makers, of course, whose plates are of the highest quality, and, while making the above remarks about Wratten's plates, it must not be thought I am running down every other plate.

I would first say a few words as to the light in which these plates should be taken out of their packings and put into the dark slides.

If the sun shines on the dark-room windows it will be advisable to have two thicknesses of ruby glass, or one ruby and one deep orange. If the sun does not shine directly on the window, one ruby and one canary medium, or even one deep orange and one canary medium, would be enough. It is, of course, understood that plates are exposed to the light as little as possible.

After dark a candle with two thicknesses of canary medium will answer, or a small kerosine lamp in place of the candle.

The dark slides should be well dusted out after moving the sliding shutters in and out two or three times, and the sensitised surface of the gelatine plates should be gently wiped with a very soft camel's-hair brush or a clean piece of silk velvet. The sensitive surfaces are placed

downwards in the double dark slides, so that, on shutting up the slide, the *backs* of the plates are towards each other.

It is, of course, practically impossible to give the times of exposure necessary for all possible subjects under every possible circumstance, but the following table will give a novice some idea of the exposure needful for certain subjects, *when the sun is shining brightly*, between 9 a.m. and 3 p.m. on any day in the year within a few degrees of latitude 13 :—

Using stop.	Sea and sky.	Open Landscape.	Landscape with dark foreground or street scene.	Outdoor groups or animals.	Portraits in open verandah, using a reflector.	Temple Muntapam, carved pillars inside.	Light interiors. — About	Dark interiors. — Not less than
No. 8 *f*-11.	$\frac{1}{150}$ sec.	$\frac{1}{50}$ sec.	$\frac{1}{25}$ sec.	1 sec.	1½ secs.	2 secs.	30 secs.	4 mins.
No. 32 *f*-22.	$\frac{1}{50}$ sec.	$\frac{1}{25}$ sec.	$\frac{1}{12}$ sec.	4 secs.	6 secs.	8 secs.	2 mins.	16 mins.

For further particulars as to light, &c., I must refer the readers to my exposure tables for the Presidency of Madras, obtainable at Messrs. Oakes & Co's., Mount Road, Madras, the form of which is founded upon some English exposure tables published by Messrs. Cadett & Neall, the celebrated makers of very quick plates.

The developing formula recommended by Messrs. Wratten & Wainwright for their Instantaneous plates (when reduced to its proportions per ounce) works out thus :—

Pyrogallic acid	3 grains.
Bromide of potassium	½ grain.
Liquor ammoniæ, ·880	2½ minims.
Water to	1 ounce.

I have found the following to be the most satisfactory way of making up stock solutions of the requisite chemicals :—

No. 1.—*Pyro.*

Pyrogallic acid	1 ounce.
Nitric acid	20 minims.
Distilled water to	9 ounces 1 drachm.

Mix the acid and 8 ounces of water together, pour the mixture on the pyro. When dissolved, filter and make up to 9½ ounces with more distilled water.

No. 2—*Bromide.*

Bromide of potassium	53 grains.
Distilled water to	10 ounces.

No. 3.—*Ammonia.*

Liquor ammoniæ, ·880	1 ounce.
Distilled water to	10 ounces.

To make 1 ounce of standard developer, you would have to take

30 minims of No. 1, 30 minims of No. 2, 25 minims of No. 3, and fill up the measure to 1 ounce with clean cold water, and so on in proportion for the number of ounces of developer required. One ounce will develop a quarter-plate, 3 ounces a half-plate, and 4 ounces a whole-plate, and, to make things as easy as possible, I give below the quantities of each chemical required for each of these plates:—

Chemical.	For quarter-plate. 1 ounce.	For 5×4 plate. 2 ounces.	For half-plate. 3 ounces.	For whole-plate. 4 ounces.
No. 1, Pyro.....	30 minims	1 drachm	1½ drachms	2 drachms
,, 2, Bromide.	30 ,,	1 ,,	1½ ,,	2 ,,
,, 3, Ammonia	25 ,,	50 minims	1¼ ,,	100 minims
Water .....to	1 ounce	2 ounces	3 ounces	4 ounces

These are the quantities required for making up the developers to the standard recommended by Messrs. Wratten & Wainwright, but I may here mention that I have found it undesirable to use the above quantities of the pyro solution, ample density being obtainable with considerably reduced proportions. The probable cause of this difference is the much higher temperatures in which our work is carried on even in our coolest weather, which is about equal to a warm English summer, or perhaps a shade warmer.

I now come to the various kinds of negatives most suitable for various printing and enlarging processes. These are as follows:—

A. Thin negatives, full of detail, for bromide printing and enlarging by artificial light.

B. Medium negatives, for printing on gelatine or collodio-chloride paper, for enlarging by daylight and for lantern-slide making.

C. Dense negatives, for printing in carbon or platinum or on albumenised paper.

Generally speaking, the most successful way of making good negatives, in my opinion, is to slightly over-expose the plates. By slightly over-exposing, I mean giving fifteen to twenty-five per cent. more than the absolutely correct exposure. Even a greater excess than this is perfectly allowable without in any way endangering the success of the proposed picture, as it can be very easily rectified during development.

By over-exposing your plate you do at least make sure of obtaining the fullest detail in the darkest shadows, while an under-exposed plate is either useless for any purpose or has to be fogged by being forced up with excessive quantities of alkali.

Supposing the subject to be the very common one in India—a roadway, more or less over-arched with the top branches of tall trees, with the sky peeping through here and there, forming the highest lights, while the shady side of the trunks of the trees and the underneath parts of the lower branches contain the deepest shadows—this picture would come under column No. 3 of the exposure table given earlier in this article, 'Landscapes with dark foreground,' and the exposure with stop No. 32 (*f*-22), sun shining brightly, is shown to be one half of a second. This

is about the correct exposure, and would give a good negative with a developer containing at once the full quantities of each chemical—pyro, bromide, and liquor ammoniæ. If, however, there be no wind, and other circumstances (people walking about, &c.) permit, it would be wiser to give three-quarters of a second, or even more, and then there is a greater certainty of all possible detail being got out.

The plate being exposed with a full exposure, the question arises what sort of a negative is wanted—thin, medium, or dense. We will take these in order, and with three plates, each exposed for the same period on the same subject under precisely similar circumstances, we will produce one negative of each of the three kinds.

For Class A, thin negatives, take of the stock solution given above :—

No. 1		20 minims.
,, 2		20 ,,
,, 3		30 ,,
Water	to	3 ounces.

Pour this over the plate, and watch carefully for the first appearance of the high lights (shade the plate as much as possible from the direct light from the window or lamp). They ought to appear in from twenty twenty-five seconds, and gradually gain density, the detail also increasing at the same time. Do not add any more of No. 3 so long as detail continues to appear, but if it slackens off, then add another 15 minims. When all detail is out, the density will also be sufficient, so pour off the the developer, wash in three or four changes of water, fix in clean hypo 1 ounce to 6 ounces of cold water, wash well and dry.

For Class B, medium negatives, take of

No. 1		30 minims.
,, 2		30 ,,
,, 3		30 ,,
Water	to	3 ounces.

The procedure is the same in this case, but development will have to be prolonged for a further minute or two to obtain the necessary increase in density.

For Class C, dense negatives, take of

No. 1		60 minims.
,, 2		60 ,,
,, 3		30 ,,
Water	to	3 ounces.

Development will be still more prolonged in this case, and it will probably be necessary to add at least two and probably three extra quantities of 15 or 20 minims of No. 3 before the required density has been attained.

In adding extra quantities of No. 3, measure them in a minim glass, pour into the developing cup, then return the developing solution from the dish into the cup, so as to well mix up the extra ammonia, and then pour back the reinforced developer over the plate.

A good way of making up stock hypo solution is to take 13 ounces of good clean dry crystals, dissolve it in as little warm water as possible filter it into an ordinary quart whisky bottle, and fill up with clean

water. You have then a solution every ounce of which contains ½ an ounce of hypo. To make a solution of hypo 1 in 6 for the plates now under discussion, take 1 ounce of stock hypo and add 2 ounces of cold water. You then have ½ an ounce of hypo in 3 ounces of water. For larger quantities, take 1 measure of hypo stock solution and 2 similar measures full of cold water. The 'measures' may be ounces, quarter pints, wine glasses, or anything handy.

For prints where 1 in 10 is the proper strength, take 1 measure of stock and add 4, or even 4½, measures of cold water.

The above details show how from certain exposures to make various classes of negative suitable for different printing processes, and now we come to an even more important question, how to make up the developer to meet the many various kinds of subjects the photographer meets with in course of a tour. We may, for sake of brevity, class these in something like the following scales:—

1. Flat landscapes, void of contrasts.

2. Subjects full of contrasts, such as a white house, temple, or tomb framed in a mass of dark foliage.

In either case I should recommend the same slight percentage o over-exposure previously referred to.

If the subject be a flat landscape or other view void of contrast, the developer should be made up of—

No. 1		60 minims,
,, 2		75 ,,
,, 3		30 ,,
Water	to	3 ounces,

adding 20 to 30 more minims of No. 3 after all detail is out.

In the case of No. 2, subjects full of contrasts, the developer may be—

No. 1		15 minims,
,, 2		10 ,,
,, 3		40 ,,
Water	to	3 ounces,

adding a little more No. 3 if the details in the shadows do not show pretty quickly. The object is to get out the details before too much density has arrived.

CONTACT COPIES OF LANTERN SLIDES WITHOUT UNBINDING —REVERSING NEGATIVES.

By F. H. Glew.

It is sometimes a convenience to be able to copy lantern slides without removing the cover glasses, as the thickness of the cover glass makes it impossible to get sharp contact negatives, and the only alternative is to copy in the camera, which is a much more tedious operation.

By the following process any number of lantern slides, &c., may be copied at one exposure, and the thickness of the cover glass may be disregarded; the secret is to use a point of light as the illuminating agent. The most convenient source of light is a small four-volt electric lamp, and

if this is arranged two or three feet away from the slides during exposure the copies will be absolutely sharp, even the finest engraving lines.

Proceed as follows: Say twenty slides are to be copied, arrange twenty lantern plates, face up, on the dark-room table, five deep and four broad; place a slide on each plate; now fix a tripod over the lot, with electric lamp projecting sideways, and turn on current for two or three minutes—the lamp must be firmly fixed. For those who have not electric light, a small benzoline vapour lamp, turned low, answers nearly as well—of course, it must be held sideways and a little on one side.

All printing from glass to glass is better done by the same method, as two glass surfaces cannot fit perfectly—in fact, all printing should be done with a point of light as the source; and the method has many advantages, even over copying with a lens, for all errors of refraction are avoided.

Reversed negatives are easily produced by this process.

For working with daylight a light tight packing-case may be used, with a small hole in the top, about one-eighth of an inch in diameter. After arranging the plates and objects, the whole can be carried out of doors, so that the hole may receive diffused light from the sky.

NOTES ON THE WORKING OF GELATINO-CHLORIDE P.O.P.

By J. Barker.

In spite of all that has been written upon the subject of gelatino-chloride printing-out paper, some workers still appear to find difficulties arise when using it. One worker finds that his prints fade, another gets double tones, whilst yet another cannot get his prints to tone at all, and so on; but it does not seem to occur to any of them that the fault is in themselves, and not in the paper.

Now, an equal number of difficulties arose with some workers when they were using albumenised paper, so that there is nothing unusual in this, and the following remarks are offered in the hope that they may be of assistance to those concerned.

One case that came under my notice, in which the prints were not only afflicted with double tones and so-called fading, but also with a crop of spots, will serve to illustrate how these difficulties may arise. The method of procedure in the preparation of these prints was to commence by washing them in two changes of water, and then putting them into the alum bath, after which they were rinsed in two changes of water again, and then toned in an acid sulphocyanide gold bath, after which they were rinsed in one change of water, and then put into the hypo bath to fix.

Now, these prints were insufficiently washed before they were put into the alum bath; also they were insufficiently washed after leaving the alum, and were, therefore, in an acid condition when put into the toning bath, which, moreover, was acid itself, and the one rinsing after toning simply left the prints still acid, in which condition they were put into the hypo bath, thus liberating sulphur, which injures the prints, alters the composition, and therefore the action, of the hypo, which is then unable to dissolve (fix out) all the unaltered organic silver chloride,

and usually leaves a sulphur compound of silver in the print, which sooner or later is sure to discolour.

To those who encounter these difficulties I would suggest that the preliminary washing of their prints should take fifteen minutes, not less than five changes of water being used. That the alum bath be omitted, or, if it be necessary, a thorough washing must be again given after its use, or that a substitute, such as Epsom salts, be tried in place of the alum, followed, of course, by washing. That about eight drops of a saturated solution of the best English borax (Howard's) be added to each eight ounces of the Ilford Company's formula for the sulphocyanide gold toning bath. Avoid combined baths, as it is practically impossible to ensure that the fixing and toning shall both take exactly the same time, and, unless this is the case, it is obvious that either the fixing or the toning must be imperfect. We are told that the combined bath is quite safe, as, even if sulphur compounds of silver are formed, they are permanent. Of course, this is so, and it is this permanence in the wrong place which causes the discolouration. Finally, use only the best English hypo, and do not wash too long. This, of course, merely touches the fringe of the subject, as so much has yet to be said, but may help to clear away a few of the difficulties found by some workers.

COPYING.

By W. H. Wheeler.

I lately read a piece of advice, as to copying, not to use a lens covering a much larger plate than required, because such a lens is very likely also to admit more *light* into the camera than required, tending, of course, towards fog and haze. Holding, however, as I do, that good copying requires a full exposure and a small stop, and that it profits even more than direct photography by such exquisite optical definition as obtains in the central part of the image formed by one's very best lens (the largest and best being usually capable of covering much more than generally required for copying)—remembering, too, that a long-focus lens gives more equal illumination—I have long made a point of using, for most of my copying, one very large and fine portrait lens by A. Ross, which, especially when well stopped down, defines so excellently, that to focus it is a continual joy. This lens, when used for copying, would perhaps cover, say, 24×18, and is, therefore, very open to the objection I refer to. It thus became necessary to find some efficient means of excluding from lens and camera all light except that absolutely needed as coming from the object itself, however small might be the plate to be used; and, as I have never heard of my plan being used by any one else, I have thought it might be worth while to describe it.

I made a rough cylinder of common strawboard to slide over the lens, having a cap of cardboard, in which a rectangular aperture was cut of the same shape as the plate—say, for a 10×8 plate, an aperture $2\frac{1}{2}$ by 2 inches, the proportion being thus as one to four. This capped cylinder, when adjusted to a distance in *front* of the stop, equal to one-fourth of the distance of the sensitive plate *behind* the stop, *perfectly* intercepts all light except just that required for a 10×8 plate. Practically, by pushing

in a little for a 12 × 10, or drawing out a little for 8½ × 6½ and under, all may be readily made right for these sizes, and for further sizes another cap and aperture may be substituted. The effect of this cap screen is really remarkable for the perfect manner in which stray light is excluded, far more perfectly than by any other means I am acquainted with.

For its adjustment, I should observe that I do not necessarily use the large slide belonging to the long, rough copying camera on which the lens is placed. This is fixed into one side of a small dark room, and always ready for use. But small plates are exposed in small slides going into convenient frames arranged to fit into the back of the large camera. Thus, to verify the adjustment of the rectangular aperture, all that is needed is to take out the focussing screen, and then, applying one eye successively to each corner of the image required, to look at the *stop*. If the adjustment be *perfect*, the stop will just begin to show at each corner a darkening, caused by the edge of the rectangular aperture beginning partly to exclude the light. For practical purposes, however, it is generally sufficient to see that the stop is clear at each of the four corners, for then it is certain that nothing will be cut off from the plate.

This mode of protection I find very valuable with other cameras, &c., when photographing any dull subject situate near a bright light—such as a painting hung between two windows—for by its means the light of such windows may be so wholly cut off by a specially cut aperture that the lens can *see* nothing whatever but the painting itself. And by this means, too, the surface of the lens is perfectly protected from such obliquely directed light as, though too oblique to pass *through* the lens, may yet dull the image by causing an injurious general illumination of its surface. Even with a wide-angle lens used to its full covering power, oblique light may often cause avoidable mischief in this way. And much superfluous direct light, too, must always enter a lens (used without such a screen), which has, of course, to cover a circle whose diameter is equal to the diagonal of the plate; whereas by this means light can be limited to the inscribed rectangle corresponding to the actual plate exposed.

PHOTOGRAPHY IN THE TROPICS.

By Rev. J. W. Fall, M.A.

Photography in the tropics is by no means so easy as in the temperate zone. The intense heat, the often steaming moisture, the distance from the dealer's shop, with its supply for every conceivable need, the unworkability of some processes in anything but a moderate temperature; all these make an aspiring photographer's experiences anything but always equal, and render them often exceedingly trying.

But there are now so many votaries of the art either resident not far north or south of the equator, or passing through the equatorial regions, who, as the saying is, 'go in for photography,' that a few words out of an experience of a number of years in the East may be acceptable.

And, first, with regard to the apparatus to be used. The best modern apparatus, made by one of the best makers, with all its joints well screwed, is, with ordinary care, as good for the tropics as for England. Provided the

wood is well seasoned, and the corners are not fixed with glue, no brass binding is necessary. This is useful only in the case of some of the very cheap forms of apparatus with which the photographic craze of the last few years has flooded the market. Again, weight need not be considered. In England, where, as a rule, a man carries his own apparatus, the cry is for light articles; but in the East, where few Europeans could carry anything much in the way of a load under the 'vertical rays of a tropic sun,' and where a coolie to carry everything for you will often cost no more than sixpence a day, a few pounds more or less need not be considered. Indeed, it is probably better in choosing an apparatus to err on the side of weight than of lightness. The camera will be better made and will last longer.

In using the apparatus, either the early morning hours, before 7.30 or 8 o'clock, or the afternoon hours, between 3.30 and sunset, between 6 and 6.30, must be taken advantage of. And this for two reasons. The heat of the middle day drives most Europeans who are not forced to be out to the shelter of their bungalows or offices, and the slanting rays, before and after the sun has attained its full elevation, are most successful for pictorial photography. In a country where, according to the saying of one Indian language, midday is the hour when you stand on your own head—that is, when your shadow is all beneath your feet—breadth will not, as a rule, be obtained except at the hours named.

Again, as to exposure. It is often thought that, because the light is more brilliant than in England, the exposures will be shorter. Experience says that generally it is the reverse of this. Exposure in full sunlight is often half as long again at least as would be necessary in a similar picture with full sunlight in England. The reason seems to be that the intensity of the light rays obliterates detail both in the lights and in the shadows. The lights are a glare requiring longer exposure to bring out detail, and the shadows are often as black as midnight. My experience with the hand camera is that, on a sunny summer day in England, the same exposures give far better results than on a similar day in the East.

Again, it must be remembered that, in figure photography, a dark face requires a longer exposure than a white. But beware of exhibiting a portrait of himself to a native. He will seldom criticise the likeness or artistic merit of the picture. Nine times out of ten he will remark, 'But, sir, the face is very black.' You must, to please him, give such exposure and treatment to your plate as will render the chocolate hue of the Hindu as fair as the pallor of the European.

I have never, except on one occasion, when I was stoned by a mob, and had to flee in order to protect my valuable whole-plate camera, found a native crowd other than quite friendly. They do not stick themselves into the most prominent part of a picture with an air of 'I've as much right here as you,' but are generally willing to obey a courteously worded request to move on.

Nothing too strong can be said as to the care necessary to preserve plates from destruction by damp. This all-pervading dampness in most countries near the equator is a terrible enemy. Whole batches of plates will go, and no ordinary precautions will save them. If a man can afford it, every one-dozen box of plates should be sent out in a soldered tin case, which should not be opened until needed for imme

diate use. With such a precaution, probably little danger need be feared.

Then, again, in arranging dark rooms and furnishing them, home-made, with all the necessaries of sink, dishes, lantern, water supply, &c., much might be said; but perhaps what has been already written will be deemed sufficient for the help of some of those many globe-trotters who, as the years go by, visit us in increasing numbers, bearing in their hand the ubiquitous hand camera, and photographing us, our bungalows, our servants, and our surroundings, but who, for some occult reason, so seldom seem able to furnish us with visible proofs of their skill.

L. S. D.

By Frank Miall.

Year after year how often one hears the cry of 'Bad trade, The public seem tired of photography,' 'They want a new style, a new sensation.' Well, is there not one at your door waiting to be let in? and, moreover, one that, if you foster and introduce it to your clients, will meet with every encouragement, and bring you £ *s. d.*

This article is not the philosopher's stone, at whose touch everything will turn to gold, but simply stereoscopic photography, an old and tried friend, who has brought, in the years gone by, good returns of £ *s. d.* to a great many workers: and as it has been, so it can be again, and to any one that will take such pains and care as to produce the best results, there is undoubtedly a successful yield of £ *s. d.*

Interesting subjects for stereoscopic photography are on every hand—outdoor scenes, interiors, groups, animals, portraits—in short, almost every subject that will give a picture with one lens, is greatly enhanced by the use of two, and the results will give pleasure to your customers (to most of whom it will be a novelty), and, what is more pleasing to yourselves, £ *s. d.*

A VISIT TO ROCAMADOUR.

By Lt.-Col. Gubbins.

Some years ago I read, in a periodical, an article headed 'An Albert Dürer Town,' describing a pretty place called 'Rocamadour;' and I arranged to visit it last spring, with my wife, on our way back to Paris from the South of France, where we had been for a trip. We travelled *viâ* Toulouse, and, as the train did not stop at Rocamadour, we had to get out at the previous station, Gramat, and we drove in a kind of omnibus to Rocamadour. The country we passed through, both at the latter part of the train journey and in this vehicle, is most extraordinary; many of the fields looked more like bits of newly macadamised roads than anything else that I can think of, absolutely no earth was visible, and if I had not noticed a partly cut crop of trifolium in one—only stones showing where the crop had been cut—I should never have supposed that these enclosures were ever cultivated. Rocamadour is one of the

most marvellous places imaginable, a narrow valley with a small stream running along the bottom, and steep, almost vertical—in some places, even overhanging—rocky sides, the sanctuary and numbers of chapels perched about, wherever level spots could be found, or made; and a straggling village near the bottom, but above the level part of the valley. It was a pilgrim resort from very early times (St. Amadour has been identified as Zacchæus the publican!) and at one time was, owing to the numbers of offerings made by the pilgrims, a wealthy place. For the protection of its treasures it was fortified, with a wall and gates to the town, and a château or castle on the plateau. The very picturesque gateways and a few bits of the wall still remain, and the château is now used as a clergy house. The sanctuary has been twice destroyed in modern times; first by the Huguenots, and again during the Great Revolution, but has been rebuilt on each occasion. The place is undeniably beautiful, and, notwithstanding the extraordinary stoniness of the ground, wild flowers abound, lilies of the valley in particular. If there were a decently clean hotel, or lodging, to go to, it would soon be well known to artists; but the accommodation is very poor, and there is absolutely *no* drainage. The people of the hotel (?) at which we put up were most willing and obliging, but they did not know what to do. It would seem that the English have not yet invaded the place, and taught them that we like, *and will have*, cleanliness; the inhabitants may be very godly, but they certainly do not possess the next virtue. From what we saw on arrival, we expected to be uncomfortable at night, but the beds were clean. If the place had been more tempting in the matter of accommodation, we should probably have stayed on for some days; but, as it was, we could not stand it, and only spent one whole day there—hardly enough to explore a place in, and take photographs as well. I managed, however, to get a few pretty pictures, though not so many as I wished to, and it was with mingled feelings, of which delight was the strongest, that we left for Paris after a stay of a day and a half.

If any one wishes to 'do' Rocamadour, I think that the best way would be to put up at Toulouse, and go there and back by train in one day, but it makes a very long day of it. Some, of course, there are who don't mind roughing it, but many prefer to keep out of the way of dirt and insanitary arrangements. Whichever way is selected, no one who has ever seen the place will say that it is not worth a visit. We enjoyed our trip immensely, and our pleasure has not been spoilt since by the frequent repetition of the question, 'But where is Rocamadour?'

TESTING LENSES.

By P. Everitt.

It would seem almost impossible to say anything new upon this well-worn theme, but in October last year an article appeared in the *Photographische Correspondenz*, by Herr W. Zschokke, describing a new method he has worked out. It seems to be little known in this country, and a description may be interesting to some of the readers of the Almanac. On a vertical, evenly lit, white surface, a system of horizontal and vertical lines is drawn. These are half a millimetre thick and twenty millimetres apart. Starting with o at the centre, each fifth line

is numbered in both directions. The focussing screen of the camera is so inclined that it forms an angle of 75° with the axis of the lens. The camera is so placed that the axis of the lens shall be perpendicular to the test object at o, and that the reduced image shall be one-tenth of the size of the original. If the chemical and visual foci of the lens coincide, and the focus has been accurately adjusted at o, that point will be sharpest in the negative. If they do not coincide, some other point, in front or behind o, will be the sharpest. The depth of definition may also be determined by the number of well-defined lines falling on the plate in its inclined position.

Flatness of Field and Astigmatism.—Assuming the chemical and visual foci coincident, the axis of the inclined focussing screen would be the line along which the points of best definition would be found if the lens had a flat field and no astigmatism. Astigmatism is shown by the difference in sharpness of the horizontal and vertical lines, and it may be measured on the negative by drawing curves through the points of greatest sharpness, first for the horizontal, and then for the vertical lines. The distance between these two curves will be the measure of the astigmatism, and their mean the field of average definition for the lens. Those who wish to study the method further should read Herr Zschokke's article, and another by Herr Loehr in Dr. Eder's *Jahrbuch* for 1897, which both contain the mathematical formulæ, and give a method for expressing the results numerically. Theoretically, in comparing lenses with more than one combination, their relative apertures should be made equal by placing a black mask immediately in front of the front combination; but the practical photographer may disregard this, as he is not likely to use such a mask, and wishes to get the lens most suited to his work.

'BUY GUM' OR THE ADVANTAGES OF THE GUM PROCESS.

By Frank M. Sutcliffe.

Photographers have long wished for a method of printing over which they could have complete control. The existing ways of printing in silver, carbon, and platinum, in the hands of all but the most skilful, give mere mechanical reproductions of a mechanically made negative. The craftsman, aware of this monotony and want of life, tried to add to the negative, by matt varnish, tracing paper, and blacklead, all that which the lens and plate had failed to see and secure; and, further, by sunning down the prints in places, tried to hide all that which the lens and plate had seen and secured which it ought *not* to have done, and which, if it had not been a mere machine, it would *not* have seen. To get rid of objectionable detail, to emphasise a light here and keep down a half-tone there, has been the wish of all photographers who see how seldom the camera tells the truth. The gum process enables the worker to modify his reproductions in the most delightful way. By varying the texture of the paper and the colour used in coating it, no two prints need be exactly alike, while the worker has it in his power to wash up just as much of the print as he wants and no more; even from ordinary negatives very good prints can be made; for instance, from an ordinary negative of a man dressed in nineteenth-century costume there is no need to wash up any more than the face and a mere suggestion of the

figure, the coat buttons, watch-chain, pocket-handkerchief, and all such irritating details can be left untouched and invisible, or they can all be washed quite away.

There is no room here to give any formula. Mr. A. Maskell's book gives all necessary instructions. The writer's first attempts were all failures, and not till a fresh and purer sample of gum was used did the prints do as they were wanted to; thin negatives, which would be thrown away or put aside as only fit for gelatino-bromide prints, can be made to give good prints, and as for expense, when the paper, paint, bichromate, and gum have been bought, there is only the water to pay for; even the expensive smoothing brush is a luxury; small pieces of paper can be evenly coated with only a hog's-hair, that is, when the paper has not too fine a surface; but paper with a fine surface should not be used, for the way which the paint and gum remain in the hollows and can be removed from the ridges of the paper makes this process unique and gives the prints a quality which even platinotypes and carbon prints on rough paper do not possess. As more pigment remains in the hollows of the surface of the paper than on the ridges after coating and smoothing, prints which are not touched with the brush during development, but are left to develop themselves, show a beautiful texture.

As a printing process, the Photo-aquatint, as Mr. Maskell calls it, is well nigh perfect. What more could any one want than perfect control, variety of colour, variety of texture, absolute permanency, and enough difficulty to make it exciting?

SUGGESTIONS FOR TRAVELLING.

By W. J. Warren.

When I received the flattering invitation of the Editor of The British Journal of Photography to contribute something novel and useful to his coming annual, I distinctly appreciated my position, for I realised the truth of that saying of Solomon, or some other equally wise and prosaic philosopher, that there was nothing new under the sun, especially in these days of the photographic press; and I have ultimately resigned myself to an attempt to comply with his latter adjective, so it is upon their claim to utility that the merits of the suggestions I am about to make rest. The photographic mishaps during a considerable amount of wandering by sea and land, the broken and spotted plates, and various other instances of inanimate cussedity dormant in apparatus, and the particularly animate and wideawake cussedity of the average porter, have impressed themselves upon me, as they must have done upon my fellow photographic travellers, and the following suggestions might be, I think, properly described as experience—a cruel but particularly impressive teacher.

Photographers may be divided, as all bodies may, into two classes—those who mean it and those who don't; those who intend to give their holiday up to the pleasurable toil of their hobby, and those who are content to press the button and let a divine providence, or the local chemist, do the rest. I don't say that the results of the former class excel those of the latter; my convictions often lean to the contrary, but it is to the men who mean it that I am writing these suggestions.

Firstly, as to the camera. I am not going to suggest the size or pattern—it would be presumptuous if I did—but I do advise that the glass focussing screen be removed, and a ground celluloid one substituted. I never appreciated this so much as when my own glass deliberately jumped from the camera, and broke itself on the stones of the Sahara, nor have I ever felt much more satisfied than when I drew the celluloid from my camera case and placed it in position. The broken fragments of glass served to reward the guileless children of the desert who were posing for me, and perhaps to-day the diamonds of some dusky Chetma beauty are the envy of the oasis. I have been equally jubilant to find I had a spare tripod screw with me, but even then I have found it worth while tying the one in use to the camera.

Another plan I have adopted is that the plates—I confess to a preference for them in spite of their increasing bulk—should be taken away unopened in their original boxes, and not backed.

Caramel, probably the most efficient medium, has a nasty habit of shelling off, and causing subsequent spots, so I back my plates as I go on just before use, and wipe it off again before repacking.

If the caramel is mixed from time to time with a little methylated spirit, it dries immediately after application, and can be removed subsequently with a damp sponge. For the former purpose I carry a piece of stiff strawboard, with a hole cut in the centre, into which the plate fits exactly. The board is laid on a piece of clean—preferably blotting—paper, the plate placed face downwards in the aperture, the backing applied with another scrap of sponge, and none runs on to the sensitive surface. The exposed plates I place face to face in pairs, and bind the whole into a solid block with gummed paper, and then wrap them in a piece of brown paper—the original wrapping—and replace them in the box, sealing it up in the same way, and endorsing a memorandum of the subjects, &c.

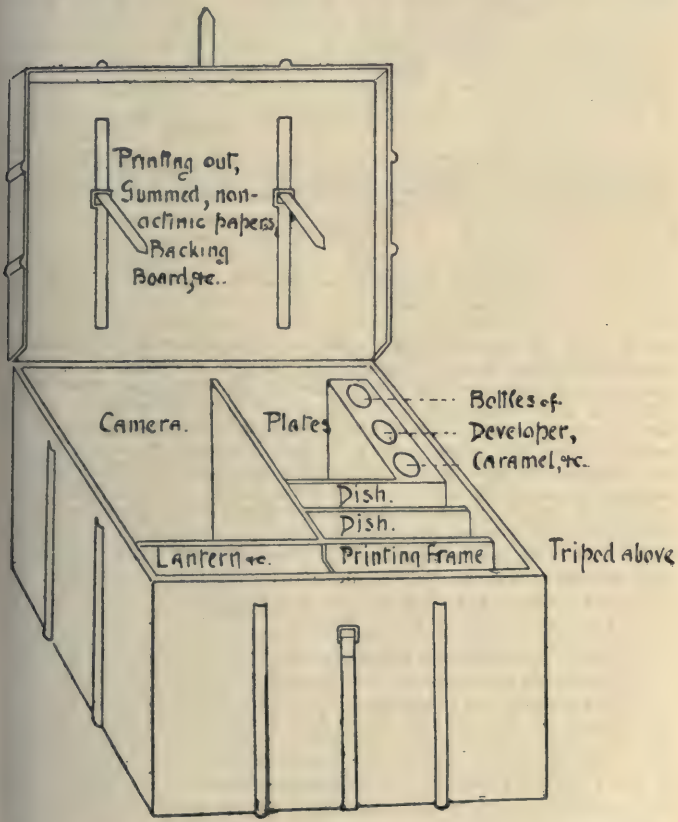
And then, oh, the merits of a scrap of non-actinic gummed paper! It will stop a pinhole in the camera or slides, mend a crack in the lantern, and be found useful in many different ways where the alternative might be serious or impossible.

Finally, as to packing the whole kit. Experiences, such as packets of plates being left behind at a resting place, cascading out of the bag when one withdraws one's pyjamas in a hurry, have convinced me that it is best not to mix them up with one's wardrobe, and so I suggest one special box for everything, and submit the little sketch below.

Its measurements depend, of course, on the size of the outfit, and therefore each of you who adopt my suggestion must work this out for himself, and a good way to ascertain this is to pile up similar articles in the same positions, measure the cube, and, allowing two or three inches for eventualities, obtain the inside measurements.

I hope the sketch is sufficiently clear to explain itself, with the exception, perhaps, of the bottle and measure holders, which are simply three holes, of the diameter and depth required, drilled in a solid piece of wood, which is screwed home in its place. The box itself should be of one-inch clean sound wood, and round it is fastened indiarubber solid tubing to minimise concussions. The interior of the lid has two straps, behind which are packed backing board, sheets of non-actinic paper for blocking a window, and gummed for mending a crack and binding the

plates together. In it there are also stuck a dozen large drawing pins, the use of which will be obvious. The box has a good lock, and also a strap round it to prevent the former straining and to carry it by. On its top should be painted the name of the owner in large letters, and all sorts of fearful warnings and penalties for opening. They haven't much



effect, but they look pretty! The end, too, should have a large initial or sign on it, so that it may be recognised at once and seized on any of those mimic battlefields—the luggage *depôts*.

And, lastly, every available space in one's baggage should be packed with Christian resignation and good temper. Both these will be seriously tested, and I heartily wish they may stand the strain better than mine.

RULE FOR FINDING THE DISTANCE AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS.

By Thomas R. Dallmeyer, F.R.A.S.

Photographers often require to know when an object is so far distant from the lens that it and all the parts of the subject that lie beyond it shall be sharp on the focal plane. This distance depends on (1) the focal length of the lens employed and (2) the intensity or aperture of the diaphragm used; and it is found in terms of *a multiple of the focal length of the lens* by the following rule:—

Divide the focal length in inches by the intensity of the stop used, and multiply by 100.

For example: The lens has a focal length of 6 inches, and is used at an intensity of F. 6. We have, therefore, $6 \div 6 \times 100 = 600$ inches $= 50$ feet.

PHOTO-CYCLING.

By James Stein.

In the end of last year you published in your Journal a paper read before the West London Photographic Society on *Cycling and Photography*, and as since that time numerous slight changes have taken place in both departments, it may be of interest to your readers to call attention to a few of them, especially considering the large number who now practice both. The advantage of combining the two hobbies has now been so often and fully dealt with that it may be accepted as an axiom, and so we may leave that question and plunge into the material question. In the first place, while plates have been steadily improved, there is no question but that films, especially rollable ones, have taken huge strides, this result being due to the animatograph and kindred machines, which have, by increasing the demand, also improved the quality, so that now there is very little to choose between films and plates; indeed, the greatest difference—which, to many, is a serious one—is when the pocket is affected; but it seems to be only a matter of time till the prices will be the same.

For carrying the plates or cut films double backs still hold their own, and rightly so, for the advantage of being able to take plates of different speeds, and use the one best suited to the subject, is no slight one. At the same time we are inclined to think that they are more prone to produce dust than the bagchangers, and this dust is undoubtedly the cyclist's greatest difficulty. In bagchanging we have an improvement in the Pulman and also in the Yale, which latter is the acme of simplicity.

The tendency during the year has been towards the smaller size of cameras. The new Tit-bit (the quarter of a half-plate) gives a size we have long used and recommended, and has much in its favour, as it is the best size for lantern slides by contact. (There may be some difference of opinion on this point, but we stick to it, the more so as a prominent slide-maker, who took us to task on the subject some eighteen

months ago, has lately been converted, and now uses the above size for his snapshots). There is one objection to many of the box cameras, and to nearly all the rollable-film cameras (of which an immense number of all sizes, shapes, and forms, from the pocket Kodak to the flat-folding $7\frac{1}{2} \times 5$, have been put on the market), which is the impossibility of using the focussing screen, and though this drawback is so great as to seem to many (especially of the older school) to preclude the possibility of serious work, we hardly think it is so bad as that, especially as we see often some very good results which cannot always be attributed to chance.

In regard to mechanical plate-changers, our opinion remains unchanged that cyclists are practically tied to the three before-mentioned methods, as we have not yet found anything else that will stand the vibration.

So far everything has been an advance, but now we come to a step backward, and one which, while being for a time only good for the film-makers, will result in killing the goose that lays the golden eggs. During the year we have seen a large number of negatives which would have delighted the most extreme fuzzyite, and careful examination has shown that the outlines are double or triple, and this we have traced to the long movement in setting and releasing the shutter. It is doubtless convenient to have as few movements as possible, but when one movement does two separate things at the same time, it is more likely to lead to complications, to say nothing of bad language.

So much for the photographic side, now for the cycling. The changes in these have also been an advance, slow but steady, and many of them would, to the ordinary rider, pass quite unnoticed, but to the rider who understands and studies his wheel it is different, and we find a champion like Stocks attributing the increase of speed during the last two years entirely to these slight improvements in the machines, and though we do not go this length, it explains to a great extent the difference between English and American machines, the latter being similar to the English of two or three years ago. Early in the season our attention was called to the number of accidents owing to broken chains. The chains being the light racing ones, the question came to be how they stood the greater strain of racing and so quickly gave way on the road. The bumping and inequalities of the surface was part of the explanation, but not sufficient. It was noticed that the chains generally gave way on a rise, and further investigation showed that the chain stays were slightly bent, thus pulling the wheels out of alignment, causing the chain to mount the cogs and snap. Further study again called attention that the racing machines were fitted with a double bracket and chain stay parallel to the chain, introduced by the Referee Cycle Company some years ago; while roadsters had the chain crossing the stay, which was further bent, and thus weakened. This point was clearly noted by Professor Sharp in his now well-known book *Bicycles and Tricycles*, and leads to the remark that it shows the necessity of having a machine built by a first-class firm, or at least one who thoroughly understands something of the strain and stress with which they are dealing.

So much for the machine, now for carrying. For a half-plate and larger we are still of the opinion that the broad-guage and tricycle is the better machine, while for the bicycle the smaller sizes are best, but instead of using the frame we have now, the carrier of an old Olympia

tandem fitted over our driving wheel, and can strongly recommend this method. It can be fixed to either gentlemen or ladies' machine, is well out of the way—the camera has in this position the least possible vibration—and, lastly, the ease with which it can be fixed and taken off will soon make it the most popular method of carrying.

AN OLD ALBUM.

By Mark Oute.

I came upon an album old, that had been stowed away
With a hundred other useless things, handed over to decay,
Where out of thought, and out of mind, in unused cupboard lie,
Till some pricking memory of the past, induces one to pry.

At sight of that old book, my thoughts flew back to other days,
Its very mildewed covers a thousand memories raise,
For it had been a treasured thing in the days of long ago,
A gallery of trusted friends, a loving picture show.

And as I turn the pages, and on the fading faces gaze,
I hover 'twixt a smile and tear—as looking through a haze
I mark the trace of time on most—and many passed away—
A fashion's term—a span of life—are dreams but of a day.

And with the graver thoughts one feels a grim humour underlying,
And smiles they come against the will, and mingle with our sighing,
For subjects crude and treatments wild so crowd on every page,
The comic side, it seemed to me, was the feature of the age.

Did pictures such commend themselves? Were they admired at all—
The lanky hair, and whiskers long—the figures great and small—
With positions and contortions that would stagger a Chinee?
It puzzles one to-day to think—they were taken seriously.

For the guys that grace these pages, with their hair grotesquely dressed,
And the ladies in their crinolines with waists so tightly pressed;
The sitting and the standing, and the posing that they show,
Are the funniest things in nature—at least, they strike me so.

As time wore on, and phases changed, and modern methods grew,
The album it was thrown aside, giving place to something new
As drawing-room accessory—it has slipped out of our ken—
When productions more imposing came, it was not needed then.

As far behind we leave it—that first milestone on the road—
We can perceive 'twixt then and now the distance we have trod:
For the impressionist is with us with his high-art display.
Will the critic of the future smile—at the pictures of to-day?

ALBUMEN *VERSUS* GELATINE.

By J. H. Baldock, F.C.S.

Another year has come and nearly gone, and our Commander-in-Chief has therefore summoned his forces, and I find myself again invited to contribute to the pages of The British Journal Photographic Almanac.

The subject I have chosen is not a new one; it crops up now and then, but just recently has perhaps attracted more attention than usual. I have been considering the subject for some time past, in view of writing an article for the Almanac, and, therefore, was pleased to note the paper by Messrs. Haddon and Grundy at the Convention, and still more recently the remarks in the Journal by your esteemed contributor, 'Dogberry.'

Taking albumen first, as the oldest, I find the charges brought against it to be mainly four in number: 1. The difficulty of getting good tones, and those uniformly. 2. Blisters. 3. Yellow spots, or a general yellowness all over. 4. Fading. But, if I look at the class of operators from whom such complaints come, I find them to consist chiefly of second-rate professionals and amateurs. I also find, from prints in my possession on albumenised paper, coming from Germany, America, and India, most shocking examples of yellowing and fading, although the tones were, in the first instance, exceptionally *good to look at*. On the other hand, I have seen prints, including some done by myself, many years old, and which have been exposed continuously to daylight, as perfect as on the day when they were first made. This would seem to indicate that prints on albumenised paper *may be* everything that can be desired.

What, then, is the cause of failure? One reason, which I do not think has been taken into sufficient account, is, that the albumen has not been sufficiently fresh when spread on the paper. Albumen is a highly complex organic body of animal origin, containing, among other things, sulphur, which is obtained either from white of egg or blood. Every one is familiar with it, in a state of decomposition, in the form of a rotten egg, and, judging from the extremely mal-odorous condition of some of the samples of albumenised paper on the market, it seems impossible to resist the conclusion that decomposition must have set in *before* the albumen was used; if so, the decomposition products, especially bearing in mind the fact that sulphur is present, must have some action on the silver image. In addition to this, probably some compound of sulphur and silver would be formed, which, not being soluble in hypo, would remain behind in the print after fixing, and tend to produce a change, not only of the print, but of the entire surface of the paper. Apart from this, some negatives seem to be absolutely incapable of giving a satisfactory silver print, and very much depends on the character of the negative, as may be easily seen by the variety of colours assumed by prints when they are taken out of the printing frame, using, of course, the same paper. As for the tone, a great deal depends on the skill and care of the operator, as it must be conceded that greater care is required in the case of albumen compared to that of gelatine.

Blisters are another great source of trouble to the producers of albumenised prints, and the ingenuity which has been expended in avoiding them is simply wonderful. The cause of them is, of course,

that the film of albumen leaves the paper, but *why* it does so has not been made clear. I would suggest three reasons: 1. Air bubbles in the solution of albumen and ammonium chloride. 2. This solution is too thick, and does not readily adhere to the paper. 3. The paper itself is too dry when it is floated on the albumen solution. Of course, in addition to these, *may be* the two reasons generally assigned, *i.e.*, great difference in the *density* of the solutions employed in toning, fixing, &c., and great difference in the *temperature* of these solutions and in that of the final washing water, but that these two cannot be the only reasons seems to be obvious, otherwise all prints done on the same paper, at the same time, and under similar conditions, ought to show blisters, which, however, is not the case.

Yellowing and fading being due, in all probability, to the same causes, whether the paper used be albumenised or gelatinised, I propose to discuss these presently, after treating of gelatino-chloride printing-out paper. Taking the gelatine first, it is very difficult to see wherein this is any improvement on albumen; it also is of animal origin; it too contains sulphur, and is certainly quite as liable to decomposition, if not more so, than albumen, especially bearing in mind that it is hygroscopic, which albumen is not. Do not bacteriologists employ gelatine for their cultures because of its ready decomposition by various forms of bacteria? This substance it is, then, which is employed to emulsify the silver salt, and the *mixture* thus produced is spread on the paper employed. Here we at once meet with a great distinction between albumenised and gelatinised paper; in the first we have a weak chemical compound of albumenate of silver, chloride of silver, nitrate of ammonia, and free acid; in the second we simply have a definite silver salt emulsified in gelatine, the film of which on the paper is much the thicker of the two.

I cannot help asking why the gelatine emulsion is spread upon baryta paper, and not upon plain paper, though I do not remember that the question has ever been raised before. One very obvious drawback is that it makes the prints very heavy, so that all the operations are less easily conducted with this paper than they are with albumenised paper. Take only the one operation of washing: In the washer, albumen prints will swim about like a shoal of herrings, while gelatine prints refuse to move unless the stream of water is almost strong enough to tear them.

The tones obtainable on gelatine prints are perhaps more numerous than can be got on albumen paper, but I doubt if they are any more pleasing to the eye. There is possibly, and I will not deny this, a certain richness and depth in the gelatine print, owing to the composition and greater thickness of the gelatine film, which is lacking in the albumen print, and this may be allowed to count for something; but, without a shadow of doubt, quite as shocking examples may be found among gelatine prints as ever could be among those on albumen, and I also have no doubt but that the 'Combined Bath,' fully treated of and condemned by me in THE BRITISH JOURNAL OF PHOTOGRAPHY for November 3, 1894, is largely responsible for this. Blisters occasionally occur with gelatino-chloride prints, and may be due to the same causes; but, owing to the great swelling that gelatine undergoes with water, they are more serious when they do occur, and are almost sure to show in the finished print unless very small.

Finally, I come to the yellowing and fading, because it is these which, after a time, render what was once looked upon as a beautiful print, nothing but an eyesore to all its beholders. As I pointed out in my paper on the 'Combined Bath' above referred to, and as again shown by Messrs. Haddon and Grundy (though they do not in any way refer to my *previous* paper), these effects are both due to the same cause, *i.e.*, imperfect fixation. With the combined bath this is easy to understand, because the prints *may be*, and probably *often are*, toned *before* they are fixed, added to which, lead is introduced, which, as I showed, is difficult to eliminate. True it is that since that fatal bath was introduced, a second fixing in plain hypo has been suggested; but, although in this case not much time is saved, still, and what is of more consequence, is the fact that the silver salts are more completely removed.

If the readers of this article will kindly refer once more to my paper of November 3, 1894, they will see that, for the absolutely perfect elimination of all silver salts, I recommended either the employment of a twenty per cent. solution of hypo, washing, and then a bath of ten per cent. ammonia, previous to the final washing, or a strongly ammoniated solution of hypo. The reason for this was on account of the ready solubility of silver chloride in ammonia. What I actually did use was a twenty per cent. solution of hypo, containing twenty-five per cent. of a twenty per cent. solution of ammonia. This, I believe, removed every trace of silver, for paper thus treated has remained perfectly white under the influence of light ever since. Personally, I use a ten per cent. solution of hypo, ammoniated, turning the prints over by hand several times during at least twenty minutes. This I consider safer and better in every way than using a stronger solution. Here, again, my observations seem to be corroborated by the actual experiments of Messrs. Haddon and Grundy, as detailed by them at the Convention, and published in THE BRITISH JOURNAL OF PHOTOGRAPHY on July 23, 1897. It is true that their paper refers to albumenised, and mine to gelatinised, paper; but, taking both results together, they seem to point to the same conclusion I referred to near the commencement of this article, *i.e.*, that yellowing and fading are both probably due to the same cause, insufficient fixing, and that this applies equally to whichever kind of paper is used. The outcome of it all is that there does not seem to be any sufficient reason why just as good prints should not be obtained upon albumenised paper as can be on gelatinised paper, the conditions of success being known, the causes of failure being also understood, and the requisite care being taken to obtain the best possible results.

LANTERN-SIZED NEGATIVES.

By Rev. B. HOLLAND.

IT may be remembered by some that I wrote a short article in last year's ALMANAC advocating the employment of a square plate in the hand camera, and another season's experience in the use of such a plate strongly confirms its utility. As to the best size, that must be a matter for individual taste, but any size up to four inches will be found serviceable. If lantern size is adopted, many advantages will accrue that are certainly deserving of consideration. The resulting negatives will

not only be inexpensive in production (which, to some, may be a recommendation), but they can also be made available for several purposes. Direct prints from them need not appear at all insignificant, as, artistically treated, they bear comparison with much larger work, and may even be made more pictorial. One great advantage in working this size is the smallness of the apparatus required, allowing it to be carried on excursions, where larger would be awkward. Great sharpness, too, may be secured in small negatives, rendering them very suitable for lantern slides and enlargements. Some of the choicest bits, made large enough for wall decoration on bromide paper are not only a source of pleasure to the producer, but would never be recognised as the outcome of what some might reckon an unworthy origin.

What a boon, also, to the cyclist a small camera is! The weight is so trifling, while, if it is properly made with necessary movements, an open landscape or the front of a cathedral, a happily posed group or a striking cloud effect, can be taken as successfully as if one had to set up a huge machine on a heavy tripod, and required a stalwart porter to carry the load.

Let those who have never enjoyed the fascination of this method of work try it, and, if their photographic delight does not increase by leaps and bounds, they will be difficult indeed to please.

ENLARGING BY DAYLIGHT ON NIKKO AND OTHER BROMIDE PAPERS.

By J. H. Smith.

As the Eastman Company, in their instructions for Nikko and other bromide papers, do not give hints for enlarging by daylight, I send, as my annual contribution to the pages of the Almanac, a few remarks on the above subject. Nikko paper lends itself admirably for enlarging upon up to $8\frac{1}{2} \times 6\frac{1}{2}$ and 12×10 from good, clear negatives, the enlargement not requiring any working up, only careful spotting, the finished print having a very pleasing pink hue. To enlarge by daylight, a window should be selected facing north, if possible (but this is not absolutely necessary), and should have an uninterrupted view of the the sky. Block out your window, leaving a space large enough to take your carrier with the negative you wish to enlarge. Place a board outside, covered with white paper, at an angle of about 45°. This will act as a reflector. and throw the light through the negative on to the bromide paper. Place your negative film towards the camera (unless you wish a reversed enlargement, if so, place the negative the opposite way); take out the focussing screen and place the back of the camera close to the negative. Block out all white light. I use a Lancaster's rectograph whole-plate lens, to which I fit a cap made of deep orange or ruby glass. This is a great advantage in enlarging, as, after focussing, and when placing the bromide paper in position, you can tell at once when the image is in proper position for exposure. I use a 12×10 printing frame, having a piece of fine white blotting paper as a pad. Place the frame upon the support and focus enlargement upon this, moving it backwards or forwards to get the requisite degree of sharpness. Now place your

bromide paper in the frame, stop the lens down about half way, and expose. The time required from a good average negative will be from one to two minutes with a good light; but, as the light varies very much at different times of the year, this must be only taken as a guide. Should one part of the enlargement appear more illuminated than the other, or should the negative be thin at one end, take a piece of cardboard and move it up and down midway between the lens and the bromide paper during part of the exposure, thus blocking the part that requires it. If a vignette is required, cut out a shape in cardboard, and hold it three or four inches from the bromide paper, and move it round and round without stopping during the exposure. This, if done properly, will give a fine, soft vignette. Should an enlargement be over-exposed, or have a muddy or green appearance, tone it in the combined bath, as given by the Eastman Company for their Solio paper. You will be pleased with the result, and thereby save an enlargement, which would be otherwise useless. There is no need to give instructions for developing, as this is given in every packet of paper sent out.

PAPERS AND PLATES.

By the Rev. J. Carter Browne, D.D.

Whilst of all the arts, photography is by no means the least progressive, there are phases of it which absorb no inconsiderable time in development.

In regard to the making of the picture itself, the Daguerreotype positive was not long before it found itself superseded by albumen as the substratum whereon a negative was formed. This substance, owing to many difficulties in its preparation and use—most beautiful, though the results invariably were, as shown in the effects produced by such distinguished workers as Messrs. Ferrier and Soulier—held its own only until collodion came in for a reign of over two decades. Injurious or not, certainly the fumes of the ether employed in its composition were so far unpleasant, that the photographic world hailed, with no ordinary sense of relief, the introduction of gelatine, which, so far, seems to have come to stay, and, until something be discovered which may help to further the reproduction of natural colours, one may almost safely predict that, in due time, the gelatine plate will be able to keep its jubilee.

Photographic papers, on the other hand, seem far less conservative in their tenure of office. True, the old albumenised paper held its own for very many years, and is, even now, far from being allowed to fall into desuetude, but the anxiety with regard to permanency is an element which points, sooner or later, inevitably to its disuse. The use of collodion and gelatine as a substratum for the negative naturally quickened the introduction of collodio-chloride and gelatino-chloride papers, and probably, so far as brilliancy, combined with exquisiteness of detail, is concerned, either of these, especially the latter, would be hard to supersede. It must therefore be no small relief, to those who wish to hand down to posterity representations of life in the dying nineteenth century, that platinotype not only claims for itself absolute permanency, but it seems also to have the courage of its convictions. It is only within the past year that I have taken up this method of printing, and, until

something very much superior is brought out, shall be strongly inclined to make a lifelong friend of it. In artistic effect it certainly stands second to none of its *confrères*, but to my mind this great charm is considerably enhanced by the ease and rapidity of manipulation. Frequently I place a print in the window over night, and even before breakfast time it is fully printed, and in less than half an hour mounted and practically finished. The paper lends itself also so kindly to the use of the pencil. Like all else in creation, it has its enemy. In this case humidity is the delinquent, but, so long as the paper is kept dry (by the use of chloride of calcium), one has little or no anxiety as to the rest. To those who have not yet used it, as an amateur, I would certainly say, 'Try it.'

METOL OR PYROGALLOL.

By E. Dunmore.

The little time I have had of late to devote to photography makes me anxious to get the best results with as little trouble as possible when I do indulge in making a few exposures. For many years pyro and ammonia was my sheet anchor, varied occasionally with pyro and soda, and the results were satisfactory; but of late, whether it is owing to an alteration in the manufacture of the emulsion or my own fault, I have not been able to develop a negative *entirely* to my satisfaction with either of these developers if it has been a *trying* subject. I mean by a trying subject one with very dark near objects and light distances, the detail in the shadows coming out too thin, if at all, for good printing, and the lights too dense, although the exposure seemed ample. This applies to several makes of plates I have tried of good repute, so I decided to try in lieu of them metol in combination with hydroquinone, as recommended by Mr. W. B. Bolton, with the most happy results; so much so that I have quite relinquished the use of my old friends for this special combination. If the exposure is anything nearly right there is little difficulty in making a good negative, though for unknown exposures, especially if they are suspected of being over-exposed, I hesitate to recommend it, as, of course, with a one-solution developer, as this is, there is not the same facility for tentative development as with pyro, ammonia, or soda, and the alkali added drop by drop, otherwise I do not think there has been a better form for development published. The only drawback to its use is its effect on the skin. In a day or two after dabbling about in it a kind of subcutaneous eruption on the fingers develops itself, but there is only a slightly unpleasant feeling, no actual pain. Eventually the skin becomes hard and peels off, leaving the fingers looking very unsightly, as if they had been badly burnt or scalded, and some weeks are required for them to assume their normal condition. I find that now, since my skin has become affected by it, merely the slightest moistening of the fingers that have been before affected with this developer will start the eruption. I may say I had used it dozens of times before I suffered any ill effect from it whatever, but now the case is altered, and I have to be very careful how I permit it to come in contact with my hands. However, knowing what to expect, precautions can be easily taken to avoid these unpleasant consequences.

A CHEAP AND SERVICEABLE ROCKING APPARATUS.

By J. F. Hammond.

Obtain any old four-legged stool or chair, which may be found at any second-hand furniture stores. Saw off about half an inch from the bottom of one of the legs and screw on to this a slip of wood, of any convenient length, and about a quarter of an inch thick, this slip to come between the bottom of the leg and the floor. Next, fasten to the top of the chair or stool a square or oblong piece of wood, so as to form a table-top. On this place your dishes, which may be of any number, according to the size of the table-top; press your foot on the projecting slip of wood, and your rocker will work.

A CONTAINER FOR IRON SOLUTION.—FERROUS OXALATE DEVELOPER.

By W. Eaton Bragg.

In spite of the so-called 'advantages' of metol and amidol over ferrous oxalate for the production of lantern slides and prints on bromide paper, the latter appears still to have a considerable number of adherents. After all, faithful old 'ferrous' is hard to beat, its only serious drawback being the poor keeping qualities of the 'iron' solution. From time to time there have been suggestions of one kind and another as to the method of bottling, but, as far as my experience goes, all have been more or less inconvenient and messy.

The following is the description of a clean, effectual, and cheap contrivance for keeping this solution. A glance at the accompanying sketches will show that the whole apparatus consists simply of—

One 'Hock' bottle (minus a bottom)	0*d.*
One small 'stop cock' (ebonite or glass) .....8*d.* or	9*d.*
One strip of wood (old chocolate box)	
Three bits of „ „ „	1*d.*
Two strips of tin, three-eighths of an inch wide (old coffee tin)	0*d.*
One cork.....	0*d.*
Total	10*d.*

To prepare the bottle, the bottom must first be disposed of. This may be done in either of the following ways: Cut a nick with a three-cornered file round the side about an inch from the bottom; then touch with the tip of a red-hot poker and a crack will be started which must be followed round until the bottom becomes detached.

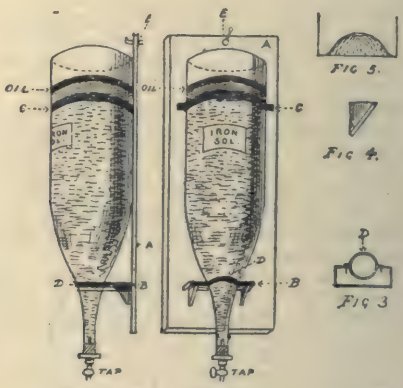
The alternate method, which is considerably shorter, and equally successful, is to select a bottle with a 'conical' bottom (fig 5), and, after wrapping a towel round the body, place it flat on a table, and, while holding firmly with the left hand, give a sharp tap in the centre of the cone with the end of an iron poker held about eighteen or twenty inches

from the end. In nine cases out of ten the bottom will be knocked clean in without otherwise injuring the bottle.

After clearing all chips of glass from the inside, fix a sound, tight-fitting cork in the neck through the centre of which, by the aid of a red-hot wire, make a hole slightly smaller than the tap.

Insert the tap and dip the bottle up to half an inch above the cork in hot paraffin wax, to prevent leakage, repeating the operation if necessary; the tap, of course, must be plugged with a bit of wood or cotton wool during the process. A little of the liquid wax is now poured on the inside of cork, the inner end of the tap being plugged with the end of a long penholder.

The bottle being prepared, the next consideration is the bracket or support, A (fig. 1), and for this purpose the side of a chocolate box will do admirably, the proportions, of course, depending on the size of the



bottle. B (fig. 1) is a piece of wood hollowed out in the middle, as fig. 3, to take the neck of the bottle. This is fixed in position on the board by a couple of screws from the back, and, as the weight of the bottle, &c., rests on it, it should be strengthened by one or two small supports (fig. 4).

Two strips of tin, three-eights of an inch wide, cut out of an old coffee or cocoa tin, and fixed in position as at C (fig. 1) and D (fig. 3) complete the apparatus. If a hole is bored at the top, E, the whole thing will hang on a nail in the dark room, and, if not a 'thing of beauty,' will, I feel sure, if carefully constructed, be a 'joy for ever.'

When fixed in position, the iron solution is poured in, on the top of which an ounce or so of castor oil is floated to keep it from contact with the air.

To prevent any crystallised iron settling round the inside of the tap and stopping its action, a short piece of common glass tubing, say, two

inches, should be fixed into the inside of cork before waxing, the cork and tap being withdrawn for that purpose.

The tap can be cleared from time to time by the aid of a piece of stiff wire.

Taps suitable for this purpose can be obtained from any scientific instrument maker, either in ebonite or glass; the former is, however, preferable.

PLAIN LANGUAGE ABOUT THE SPECTRUM.

By Walter White.

The photographer who ventures to make inquiries about three-colour work is so often advised to photograph the spectrum that he may be pardoned for believing that by doing this he will settle the matter once and for all. In this he is likely to be led astray. I do not wish to speak disrespectfully, or say harsh things about the spectrum. It is a good servant, but a bad master. First mortgage your home and buy a spectroscope. The handy little direct-vision pocket spectroscopes are ridiculous for photo-spectroscopic work. For a hundred pounds or so you may perhaps get a spectroscope that will approach respectability. Having obtained this, somehow, together with your heliostat and sunlight, or your electric or other light, proceed to make photographs of the spectrum through colour screens. Having done this, ask yourself whether the results are what you require. You will probably say, 'How do I know?' and may even ask me in return if they are anything like accurate. To which I echo your question, 'How do I know?' A Chinese proverb says, 'Before commencing any undertaking ask your wife's advice and then—do as you like.' This seems to wonderfully resemble the position in colour photography, 'Make your spectrum negatives and then—do as you like.'

Who can say if results are accurate when there is no agreement as to what constitutes accuracy? We may at least say that an attempt to gauge results by means of three-colour block work is at once crude, unscientific, and reprehensible, even if the inks obtainable were less obviously incorrect than is at present the case.

Captain Abney in his latest work, 'The Action of Light in Photography,' recommends in orthochromatic experimental work the use of a test consisting of the pigments vermilion, emerald green, French ultramarine, and chrome yellow. A plate that translates these correctly in monochrome will, he tells us, correctly translate all other colours. Is there or ought there to be any difficulty in the adoption of a similar or more extended test for colour reproduction?

The study of the spectrum sensibility of plates is an extremely interesting one, and an exhaustive inquiry may, no doubt, result in the acquisition of knowledge, providing that the experimenter has a few years to spare for this kind of work. Otherwise we may safely say that a moderate series of practical experiments will probably teach more than a lifetime of unnatural experiments with the spectrum.

The main reason for the adoption of practical tests is this, that we do not meet with the simple colours of the spectrum in nature. The

statement of Ives that it is less difficult to make screens for three-colour photography of the spectrum than for that of natural objects seems to be to some extent a proof of the existence of this difference.

M. Ducos du Hauron in his recent work on three-colour photography, expressing the same opinion in another form, states that it is impossible to correctly render the colours of the spectrum with colour filters that answer to the requirements of three-colour work. 'The rendering of the spectrum would be limited to a reproduction of only the three primary colours abruptly disconnected, and without intermediate tints.' M. du Hauron explains this fact by mentioning that spectral blue, for example, is simple and does not include, as does the blue of natural objects, a green element capable of acting through the green screen.

A more striking example would, no doubt, be spectral yellow. This might be quite absorbed by red and green screens, which screens would, however, allow the yellow of natural objects, or rather its component parts, to act in both cases on the sensitive plate.

M. Vidal, on the other hand, seems to have allowed this difference to escape his notice; a remarkable statement in his latest work, *Photographie des Couleurs*, can in no other way be accounted for.

A violet screen, absolutely absorbing all yellow rays when tested spectroscopically, may, however, when used in conjunction with a red-sensitive plate, give a negative in which the yellow of natural objects will be represented by a considerable amount of light action. From this M. Vidal infers that there are invisible rays (yellow), just as there are in the case of the ultra-violet.

A very little consideration, however, will show that such a conclusion as this is not warranted by facts. Bear in mind that the yellow of the spectrum is a simple colour, and that natural yellows are to a great extent made up of green and red, and the solution of an apparent mystery is at once evident. The alleged action of the yellow rays is really nothing more than the action of the red element in the composite yellow.

In our own country some prominent three-colour workers recommend the use of a violet screen with a red-sensitive plate for producing the yellow-printing negative. It is clear, however, for the reason just mentioned, that in such a negative the yellow would not be represented by the freedom from deposit that is required if anything like accuracy be aimed at. In matters of this kind the possession of a little elementary knowledge is a decided advantage.

SUNDRIES—IMMATERIAL AND MATERIAL.

By W. T. F. M. Ingall.

The child crying for the moon used to be the type of the wanted but ungetatable; but much that the child cried for the man has got, so rapid has been the advance of science the last sixty years. Before next Jubilee I hope we shall get a plate or film only sensitive to the object, through the objective, when an electric current is passed across it, and development will take place at the same time as exposure, and no fixing required! There's a problem for the next Jubilee!

But, to come down from the moon, why have we no authoritative standard size for plates? We have for screw threads and for stops. To my thinking, the $7\frac{1}{2} \times 5$ involves the most satisfactory standard, being $1\frac{1}{2}$ to 1. Then, by this standard, the quarter would be $3 \times 4\frac{1}{2}$—$\frac{1}{2}$ less one way, and $\frac{1}{2}$ more the other—the half-plate would be 4×6, and the whole-plate 6 to 9. Although the area of the $7\frac{1}{2} \times 5$ is too large for many, especially users of hand cameras, it is a form that satisfies most people. I commend this to the consideration of the R.P.S. Carriers would accommodate the change to present cameras, and the future make would be adapted to the change.

The Fixing Bath.

I find that hypo, acidified with formic acid, and animal charcoal added, let stand, and filtered, filters out clear, and deposits that which I take to be a combination with part of the sulphur, to which latter in the fixer I believe some, if not all, of the instability of the print or negative is due, if not got rid of by the long washing. If filtered after use, this bath keeps bright. After fixing, a good rinse under the cold-water rose tap is sufficient washing. If I have observed rightly, the final drain will stand the iodide of potassium test. Other advantages are brightness and absence of frilling.

Intensification.

Mercury, coarse in general application, can be made to give a much finer and more even deposit, and without stains, if made as follows: Water 20 ounces, $6\frac{1}{2}$ drachms perchloride of mercury, thoroughly dissolve, then add $1\frac{1}{2}$ drachms of potassic hydrate. When thoroughly precipitated, redissolve with hydrochloric acid, about 1 ounce fluid will be enough to give a very slight reaction.

PLATINOTYPES.

By Thomas Bailey.

We live in the days of many printing processes. Among the most popular of these we have the platinum process, a method of printing that is daily finding more and more favour. Our best professional photographers will tell you that they do an increasing trade in platinum work. Simplicity of working and permanency are its chief recommendations. Given a passable negative, two things only are wanted to secure good prints, viz., paper that has not been affected by the damp, and correct exposure. Success in the latter largely depends on the first. If the worker can secure and keep the paper in a uniform good condition, he will soon master the exposure, and be able to turn out a large number of prints without unevenness and failure. With fresh paper the printing must be carried much further than is necessary if paper that has been affected by damp is used; hence, the printer who is unable to get the paper in an even condition will find some difficulty in turning out even prints. But, even if exposed correctly, damp, stale paper will never yield photographs equal to those produced on fresh paper. Notice must

be taken of the fact that fresh paper prints considerably harder than stale, and will require some dodging in printing. Over-exposed parts of a negative, such as a white dress or a window in an interior, should be printed up.

We hear at times of the yellowing of platinotypes. My experience has led me to believe that this is due chiefly to the paper not being in a good condition at the time of printing. Platinum photographs, that through damp are the least brown when finished, are liable to deteriorate; but if the prints are of a rich black colour, and have been properly cleared and washed according to the instructions sent out by the makers, they will stand any reasonable exposure without changing colour.

The manufacturers assure us that their paper will keep in good order for years if kept unopened in the patent tins in which the paper is supplied. This statement, I think, is hardly correct. I have often printed paper on the day of its arrival along with some that has been in stock in calcium tins for some time; whilst the latter has yielded perfect prints, the photographs on the paper fresh from the dealer have been brown and mealy.

I am often asked which is to be preferred, a silver or platinum photograph. My answer generally is, that it depends upon what is to be done with it. If it is to be placed in an album, next possibly to an enamelled photograph, and surrounded with some gaudy pictures of our army and navy, scenes from Dickens, &c, by all means have the silver print; the success of a platinum photograph largely depends on the mounting and framing. There are now on the market some very artistic mounts and scrap albums suitable for platinums. Very good effects can be got by a combination of white and grey. In conclusion, I would say that, whilst platinum prints on stale paper and badly mounted are unsightly and unstable, a rich black platinum, artistically mounted and framed, is a thing of beauty and a joy for ever.

HAND-CAMERA NOTES.

By Henry V. Lawes.

Possibly the following few notes may be of use to hand-camera men and others. I have lately been a journey to the Antipodes, and with me took my hand camera (a well-known Manchester make), my lens being a Wray rapid rectilinear five-and-a-half-inch, and the plates used were Paget's XXXXX.

My plates I carefully made up in a parcel, and then wrapped the parcel up in waterproof paper, the same stuff that packers use in lining wooden cases. On developing, I find all the plates have kept splendidly, not the slightest sign of damp or deterioration. This, I consider, shows the excellent keeping qualities of the plates, when you take into consideration that they have been in all kinds of weather—at some places, about freezing point, and, in others, anything over 100° in the shade.

Before starting on my trip, I carefully rubbed the inside of my camera well with vaseline, *not thick*, but just enough, so that one could see that some greasy substance had been put on. This I repeated at various times during my journey. The vaseline kept down all the dust, and, consequently, not one of my plates show any signs of dust spots. Before

putting my plates in the sheaths, I dusted them, and when repacking after exposure I again used the brush. Then, as regards the repacking, any one who uses Paget's plates knows that they are put up in an oiled paper and then black paper. These papers I saved, and rewrapped all my plates, and put back in the boxes I originally received them, and then had them put away in the waterproof parcel mentioned above. I might say that no plates were broken at all, although I sent my baggage from Tilbury Docks home to Manchester *per railway*.

I usually find that amongst the majority of amateurs the question of packing plates after exposure is the 'bugbear' of their holidays, and usually they obtain some elaborate tackle, &c., for this job. I think that if they will try my dodge—a very old one by the way—it will be about the simplest, and certainly the cheapest.

At any time, should a brother photographer be going the journey I have had, I shall be very pleased to give him what information I can; &c., as regards dark rooms, societies, &c. Our brother amateurs under the Southern Cross—*I speak from experience*—are exceedingly hospitable, and do all in their power to make a new chum's journey pleasant.

I don't know, Mr. Editor, whether you will permit this or not; but, as your ALMANAC is well known in the Colonies, and, I know, will be read by many friends I have made there, I wish to thank all the photographers, through this book, that I met in Australia and New Zealand for their great kindness to me in trying to make the few leisure hours I had pass so pleasantly.

PHOTOMETERS, ACTINOMETERS, EXPOSURE METERS, EXPOSURE TABLES, &c.,

By GEORGE FERNAU.

AT the beginning of my amateur photographic career I was not slow to perceive, as every tyro does, that good photography is the offspring of right exposure, and, indeed, photography is impossible without such accuracy.

How I envied other 'Camerists' in the field when I saw them majestically uncapping their lenses, and I took it for granted the image taken was unerring! I took it all as gospel at first; but, when I gradually noticed that my superiors, the professionals, often exposed three plates on the same subject, not only in the field, but also in their studios, I began suspecting they were not so omniscient, after all.

Well, I went on plodding and plodding myself, sometimes a little too proud of a partial success, but, honestly speaking, I am now under the impression that the more experience I gained, or rather the more work I did, the less I knew. I would, however, not be beaten, and, bent on mastering the subject, read fifty articles on the mysteries of exposure, bought no end of photometers, actinometers, exposure meters, and all sorts of exposure tables, but all to arrive at an unsatisfactory result, in the sense that I wanted certainties, not approximations. At times, under fair conditions of light, the meters and rules of the meters proved correct; at other times, too frequent, I must confess, under different conditions of light, the instruments on which I had pinned my faith turned out false friends, although I had done all I could to secure their good will.

So, slowly, imperceptibly, I commenced, like many others, believing a little less in meters, and a little more in myself, when one day, in a photographic tour with a Scotch friend of mine who had always expressed himself a strict adept of the rule of thumb and always swore to the uselessness of a scientific guide in exposures, I saw my Scotchman looking, almost by stealth, at what I mistook for a watch, but ultimately turned out to be the philosopher's stone I was longing for. I took, there and then, the address of the maker, and ordered the new desideratum at once.

Blessed be the day when I became the happy possessor of Wynne's Infallible Exposure Meter! All has been sunshine in my photographic work for more than a year that the little instrument has been as permanent a companion in my pocket as it has been an infallible guide to infallible good negatives. I think the word 'infallible' has never been better bestowed.

Invaluable as the meter is for prolonged exposures, it is more so even for instantaneous work in connexion with a judicious choice of the diaphragm, the speed of the shutter, and the conditions of the light illuminating the subject to be photographed.

Not only have I been able to undeniably establish the fact of the unerring accuracy of the meter, but also to witness and realise in many cases that the conditions and changes of light set at defiance the sagacity and the calculating power of the most practised operator in its valuations.

These would already be fair titles in favour of the little instrument, but I will add, that it has usefully served me to compare between one another and gauge sundry sources of light.

Now, as to comparing the different makes of photometers and different tables of exposure, let me say a few words about those that I know, beginning with Wynne's instrument.

The latter allows one to exactly ascertain the photographic value of the light bearing on the subject intended for reproduction, and to strictly estimate, without calculation, the time of exposure required for obtaining a good negative on any brand of plate, with any diaphragm, without hesitation and the possibility of the slightest mistake or error of judgment in the valuation itself or the elements of investigation on which it rests.

In the former, namely, in all the other methods of exposure with which I am familiar, whether they are derived from averages, mathematically calculated, or consist in observing the disappearance of a luminous point through a ground glass or on the-to-be-photographed subject itself, the elements of investigation are so uncertain, so precarious, that two or three operators, every one of them using simultaneously the same instrument, will invariably arrive at different valuations. This experiment I have often tried myself, with one or two assistants, and we never could agree.

In the first case, as regards tables, it is necessary, indeed, to subordinate the valuation of the time of exposure to the month of the year, to the hour of the day, to discern between a clear atmosphere, a grey atmosphere, a foggy atmosphere, a gloomy atmosphere, a limpid sunshine, a cloudy sunshine, and, finally, you must even know how to appreciate the clearness of the air in relation to the wind, as set forth in your meteorological article of March 5 ultimo.

Imagine, therefore, a poor photographer with his apparatus ready for

exposure, and more especially a hand-camera man, obliged to go into the depth of all these calculations, which in their aggregate, amount to more than ten thousand, and yet he must be correct. Not even the Italian shepherd that I knew in my youth, who could solve the most complicated problems of algebra without the use of logarithms, would have been up to the mark.

In the second case, the dwindling away of the luminous point depends mainly on the opacity existing between the eye and the instrument, on the distance between both, and on the duration of the observation, for our retina dilates in darkness and notices objects which it did not at first. There is, moreover, to be borne in mind that, in either of these methods, not sufficient account is taken of one of the most important factors in exposure, viz., the sensitiveness of any plate to be used, a sensitiveness which ought to be carefully analysed beforehand, and well known by the operators.

Wynne's exposure meter in its simple and ingenious, yet, scientific, form, provides for all and every exposure difficulty that may arise, and I think that the inventor is right in asserting that it works well, and from the Poles to the Equator, from sunrise to sunset, from brilliant sunshine to fog, for instantaneous or prolonged time exposures, for open landscapes or dense woodlands, for photographic studio or dimly lightly interiors, for copying or enlarging, for the most rapid or the slowest plate, and with all diaphragms from the largest to the smallest. In my experience of the instrument, I have, however, noticed two defects; one is mechanical, the rotatory did not always move smoothly; but this hitch, when it occurs, is easily overcome by moistening slightly the glass or the fingers when, with a little pressure, the rotation will be restored; the other occasional defect is chemical, inasmuch as the sensitised paper is somewhat prone to become moistened, especially in winter, and more especially still in summer, when, with a perspiring body the case is inadvertently placed in the pocket of one's waistcoat, instead of being left free play in a side pocket. But fortunately the paper thus moistened is not lost and soon is restored to its normal properties by exposing the back part of the case to sunshine, or any other calorific source. All this will rarely happen, but may happen, and the remedy is at hand. I would consider it advisable, however, to be provided with two instruments, for the sake of comparison, and having always one ready that normally reaches the standard tint.

With such slight precautions, go you on, Mr. Amateur, with an elastic step, to your photographic journey, and be sure that with the right exposure that awaits you, and afterwards using a right developer, a good printing paper, and a good toning bath, you will as heartily praise the 'little watch' as I do.

PAPER NEGATIVES.

By W. T. Wilkinson.

The first photographic negative ever made was doubtless on paper, and at various times since the supercession of paper by glass, paper has been used as the vehicle for carrying the sensitive film simply on account of the immense saving in weight, which is a very important item in a day's tramp with the camera.

Until the introduction last year of Wellington & Ward's negative films, paper negatives suffered considerably from granularity, which all the various messy, greasy operations recommended to do away with the grain failed to get rid of; but, in this new introduction, the paper support is so well chosen that even lantern slides made from paper negatives are free from granularity.

The paper is sold in sheets or in spools for roll-holders; it is of fair average speed, P. 60, on Watkin's exposure meter, *f*-56 on Wynne's. The best results are obtained by giving a full exposure and developing with a solution containing a little more pyro than is usual with a plate, say, four grains of pyro to each ounce of developer. The manufacturers recommend pyro-ammonia. I prefer pyro-soda, and I think our Editor will agree that the sample sent herewith is quite as good as need be wished for. In developing negatives on paper, it is difficult to judge the density by looking through, but the way out of this difficult is to adopt Watkins' system of timing development, by which method far more even results can be got with either glass or paper negatives than by guessing at density by looking through. This system of development is perfect, and only requires trying to be always used.

For making enlarged negatives there can be nothing better than these paper films in convenience and cost, and the paper back offers such facilities for working up and retouching.

A number of paper negatives can be washed in a flat 12 × 10 dish, so saving room. In fact, paper films save weight, cost, and room, and as for storage afterwards that is easy.

To obtain the very best results, the negatives, after a thorough washing and aluming, should be squeegeed, face down, on a sheet of chalked glass, and, when dry, they will strip off with a glossy surface, which does much towards ensuring freedom from granularity.

THE MODIFICATION OF CONTRASTS.

By Matthew Surface.

The use of a brush dipped in a solution of potassium bromide is usually recommended in developing negatives having very strong contrasts, but the method is not one which I have found satisfactory on the whole. I had occasion recently to take some topographical views of scenery in a lime-stone-rock district, characterised by high cliffs and deep gorges, usually brilliantly lighted on the one side, but plunged in gloomy darkness on the other. Of course the dry plate tends to accentuate such effects, and, without careful manipulation, I should have had very hard negatives indeed, but the difficulty was overcome in this manner. The plates were immersed in the developer in the usual way, and, as soon as the image began to appear distinctly, the negative was removed and rinsed under the tap; then, by holding what appeared to be the under-exposed parts under the developer again, and carefully keeping the other side out of it, the parts in shadow were brought up rather more nearly to a correct visual standard, when the plate was once more entirely immersed in the developer until development was completed. Of course great care must be exercised in treating certain portions of the plate not to allow the

developer to remain in a hard and fast line on one part only, but a gentle oscillation should be imparted to the fluid. Naturally, this plan would not answer for negatives with, say, a very small portion in the centre of the plate which required more development than the remainder, in which case a brush dipped in developer might be used, but it would do well enough in the case of such a subject as the passage of a cave leading towards daylight. The main thing is to exercise a fair amount of dexterity in rocking the dish, holding the plate at the right angle, and taking the greatest care not to allow the developer to remain too long a time in one place. One need hardly say also that the possibility of producing a good negative is also greatly enhanced by employing a weak developer. I am quite aware there is nothing new in the method suggested, and probably most experienced workers are acquainted with it; but, on the other hand, it may prove a new suggestion to many.

AMMONIA IN INTENSIFICATION.

By Chapman Jones.

The general rule in intensification is to select any convenient method, and to use it on all occasions. Hence we have some advocating one method, and some another, and with no discrimination. It is, of course, desirable to use that method that will give the effect that is sought after, but this supposes that the photographer knows what he wants, and also that he knows the distinguishing effects of different methods of intensification, and I fear that in many cases he knows neither. I have shown that, of the ordinary methods of intensification with mercury, ferrous oxalate is the only follower to the mercury salt that gives a uniform action throughout, but the very irregularity of the effect produced by ammonia may sometimes be an advantage.

One important fact relating to the use of ammonia is that the resulting image is not of a permanent character, but it may safely be employed for negatives that are not wanted for more than a few months. The increase of density is followed by a thinning of the image, and the effect varies according to the strength and time of application of the ammonia. If, therefore, it is desired to intensify a negative of a black-and-white subject, ammonia is advantageous, because it gives a considerable increase of opacity in the already dense deposit, and the slight fog over the parts that should be transparent is perhaps not intensified; indeed, it may be actually reduced. In this I find ammonia to be more reliable than silver potassium cyanide, for while both reagents are uncertain in their action, the latter appears to vary more than ammonia does in its effect upon the thinnest parts of the plate; and, as to permanency of image, there is not much to choose between them, but the advantage seems rather in this matter also to lie with ammonia.

Ammonia gives a greater intensification effect, on the whole, than one application of the ferrous oxalate method, but may give less in the thin detail. Suppose, for example, a skeleton photograph made by means of the Röntgen rays is too feeble, the detail in the bones being given but scarcely printable for thinness. Mercury and ammonia would intensify the dark background, and make the negative, as a

whole, more brilliant-looking, but the thin detail probably would be thinner than before by comparison with the other parts, and the plate would be worse after than before intensification. In such a case ammonia is quite unsuitable. It might now and again improve matters, for it is not uniform in its effects, but the probability is that its use in such a case would lead to disappointment, if not disaster. But ferrous oxalate would fully intensify the weakest parts, and by a second, or, if necessary, further repetitions of the process, any density required might be obtained; and the plate as a whole would be more harmonious, stronger in detail but not crudely hard.

DEVELOPERS: THEIR ACTION AND USE.

By W. Fenton-Jones.

I thought the Editor would have let me off this year, but a polite request, framed in his usual unctuous way, is irresistible; so, at the risk of being anathematised for my temerity, I hasten to comply with his request.

I generally make a rule of taking down all formulæ which promise to produce pleasing results, so propose taking this subject up in as short a space as can be allotted me in the issue of this year's Almanac, with the hope that it may be of service to those who have not had the time or desire to do it, as I have had. The main question is, What sort of negative do we desire to produce? Some people say, 'Give me a nice black-and-white negative;' others, 'I prefer a bilious-looking one.' I fancy I can hear the reader say, 'What do you use now?' Well, I'll tell you. For the last three years I have used the following, due to Messrs. Wratten & Wainwright, though slightly modified:—

No. 1.

Pyro	1 ounce.
Sulphuric acid	1 drachm.
Sulphite soda	4 ounces.
Distilled water	80 ounces.

No. 2.

Carbonate soda	6 ounces.
Distilled water	80 ounces.

For use:—Landscape work, equal parts of each; portraiture, or softer effects than landscape, one part of each and one of water.

The colour this produces is yellow in character, graduated according to the strength of solution, but is fast in action, doubling the speed of plates according to the H. & D. method quoted on the box. The above has been used with several different makes of plates, and has been found to act well with all. Those who like a negative with clear glass will find the following give what they want:—

Pyro	3 grains,
Bromide of potassium	3 grains,
Ammonia	2 or 3 minims (·880),

and to each ounce of water (the above being taken as for 1 ounce) add 1 ounce of saturated solution of sulphite soda. Of course, with

this there is no stain. Then, another pleasing formula is one which I believe is sold under the name of Graphol, consisting of the following :—

Eikonogen	60 grains.
Hydroquinone	80 grains.
Sulphite soda	1½ ounces.
Citric acid	40 grains.
Carbonate potash	6 drachms.

Dissolve in 22 ounces of hot water (distilled), add the citric acid after all other ingredients have been dissolved. This gives a blue-black negative, and, whilst plenty of contrast is obtained, it is not hard. To go fully into the question of developers for negative-making would take too long, so I will content myself with giving the above for that branch, and now turn to the making of lantern slides. Here, again, the colour comes into question, so we will briefly deal with it. For a nice warm sepia-coloured slide the following is particularly good :—

Solution A (as No. 1 of first formula, above).

Solution B.

Carbonate ammonia	3 drachms, 2 scruples.
Caustic potash	3 drachms.
Ammonium bromide	3½ drachms.
Water	20 ounces.

This formula is used in equal parts.

The ten per cent. solutions issued by several firms will produce colours varying from Bartolozzi red to deep black, the colour varying according to exposure, whilst those who wish for more latitude in colour will get it from Alpha plates, which, however, should be more carefully handled. A good all-round developer is undoubtedly that due to the Ilford Company, consisting of :—

No. 1.

Quinol	2 drachms, 2 scruples.
Bromide potash	30 grains.
Sulphite soda	2 ounces.
Water	to 20 ounces.

No. 2.

Caustic soda	100 grains.
Water	to 20 ounces.

This can be used for plates, transparencies, bromide, or Alpha papers, and is, for a beginner, particularly suitable, as there is no stain, which seems such a bugbear to those about to start the black art.

For bromide work, in the writer's opinion, there is no formula which can touch that of the Eastman Company, as follows :—

Amidol	1 drachm.
Sulphite soda	4 drachms.
Water	10 ounces.

This must be made freshly, and used—say, inside of a week—without further dilution. It has the advantage of working tolerably fast, and with nice velvety shadows,

'A SLIPPERY CUSTOMER.'

By Richard Penlake.

How often the above term is applied to some of our two-legged friends —ourselves too, perhaps—one never knows; but I doubt very much if any one earns that particular designation so well as our three-legged friend, the tripod. How excellently the latter skates upon some of those highly glazed floors that abound so profusely in our ecclesiastical and other notable buildings! I sometimes wonder how some people manage to get in and out of church at all.

Patent appliances to prevent slipping have at various times found their way into the market, and I have a strong suspicion that that is as far as they ever did get, for I never heard of, or saw, any being used. Cork and indiarubber tips, as well as many other simple and useful dodges, are often recommended by some of those publications that are so fond of ramming such simple and useful (?) dodges down one's throat, but I doubt very much if the writers of those 'pars.' ever used them; if they did, it was certainly under very favourable circumstances, or I think they would have found that cork, indiarubber, &c., were, when placed at a certain angle, quite as slippery as the original wood, iron, or brass tip of the tripod leg.

One would think by the above remarks that I had discovered the philosopher's stone, or had patented an invaluable invention of my own, but such, I can assure my readers, is not the case. I would it were. My object in writing these few lines is to give my experiences of slipping tripods, and also to relate a little adventure, the further possibilities of which I will leave for those who have plenty of spare time on hand for experiment.

During the past summer I made many negatives of the interiors of our most important buildings, and, while so doing, I had the opportunity of trying all the dodges I knew of to prevent my tripod legs slipping. The result of it all is, my tripod legs are fitted with sharp iron spikes of about an inch in length. I find nothing more efficient. In the majority of cathedrals I find cracks, joins, or inscriptions cut in the floor, and into these I stick my spikes; if the said cracks, &c., are of sufficient depth—and most of them are—there is no danger of the tripod slipping. Should such conveniences not be at hand, cocoanut matting a hassock, or other soft flooring material, is sure to be there; into such the iron spikes will easily stick. Always have the tripod legs as near together as possible, because, the further apart they be, the more likely they will be to move. Sanderson's patent camera, by the way, is a most useful piece of apparatus to architectural workers, because, when once the tripod holding the camera is firmly fixed, there is no need to again move it, because the patent front does all the 'getting in.'

And now for the little adventure I spoke of. One morning I was exposing a plate (the last I had with me) upon the beautiful marble that surrounds the shrine of St. Cecilia, in Brompton Oratory. I had just taken off the cap with the intention of giving ten minutes' exposure. Five minutes had gone when I accidentally knocked against the front leg of my tripod, and moved it about an inch. (Yes, it was really I that did it, not a visitor, as I was locked alone in the place.) Many things both

good and evil passed through my brain at that moment, more especially as it was my only plate, and a very large one too. To put on the cap would mean under-exposure, and that would not do, as there was much detail in the darker parts; to expose the full time, *i.e.*, ten minutes, would mean a double image, so I gave up all idea of a good result.

Suddenly an idea struck me, and I made up my mind to considerably over-expose the plate, and also to develop for extreme over-exposure; by so doing I thought perhaps the long exposure would develop correctly, whilst the shorter exposure would not show. Such proved to be correct. I gave the plate twenty minutes' exposure, and developed accordingly, with the result that the fifteen minutes' exposure developed up very well, while the five minutes' portion refused to appear.

The above dodge would, of course, not be possible when windows, or other very strong high lights, appear in the field of view, because the light is sufficiently strong from the same to cause a 'ghost' to appear, no matter how short the exposure may be.

I do not say my discovery (?) or experience is new, because it seems such a simple thing to do, and many perhaps have done the very same thing; but, after being a constant reader of the journals for many years, I never remember seeing such an instance recorded. It may be, therefore, that my little experience may be the means of saving a brother photographer's plate, should he meet with such a misfortune.

HINTS ON OUTDOOR WORK.

By Thos. Stokoe.

The Editor has done me the honour to ask for a contribution for the Almanac, and, as a request from the autocrat of the editorial sanctum carries the authority of a command, I am fain to comply by giving hints as to a few helps in out-door work. And, first, let me recommend a flat leather bag, with cover, with strap over the shoulder for carrying a dark slide for the largest camera employed. Only one who has used such a bag can appreciate the convenience of having the slide carried securely and protected from the light, while both hands are free for fixing the instrument.

For making the exposures, I would suggest the use of a sky shade, instead of a lens cap or other contrivance, as, by slowly raising and lowering the flap, a longer exposure is given to the foreground than to the sky. By this means I have often succeeded in getting natural clouds of correct printing density.

Another appliance which I had made to my own design, and have used with advantage for some years, is a tilting table for fixing to the top of tripod stand. This, perhaps, is more useful in the lofty interiors of churches than in out-door work, but is always serviceable where a high building has to be dealt with at close quarters, as it avoids the necessity for placing the camera at a perilous angle by means of the tripod legs. My table for a 10×8 camera is about six inches by five inches, of two pieces of wood, clamped, and hinged at the back. The lower half is fixed to the tripod head by a bolt and flynut, and in it is an opening, through which the camera screw is passed to a hole in the

upper half to secure the camera resting on it. A piece of brass with a slot in it connects the fronts of the two leaves, and the upper leaf is fixed at any required angle by a set screw in the lower leaf working through the slot. This piece of brass is pivoted on a screw, and, when the table is not in use, lies along the front of the flap to which it is attached.

Lastly, a hint as to the photographing of horses. I have found that the best way of getting them quiet in an animated pose is to have another horse led within sight or trotted within hearing of them. This discovery was accidental, for on one occasion, after vainly trying to secure a good pose in a hunter, whose rider was anxious to be off to the meet, and whose patience was well-nigh exhausted, I was on the point of giving it up for that day when another huntsman trotted his horse along the road within hearing. My subject immediately stood at attention, and I secured one of the finest negatives of a horse I ever took, a picture which brought me both credit and profit. I have since repeated the experience, and, when photographing horses in a meadow, have tried having one led across within sight with equally good effect.

A CONVENIENT WORK AND DARK ROOM.

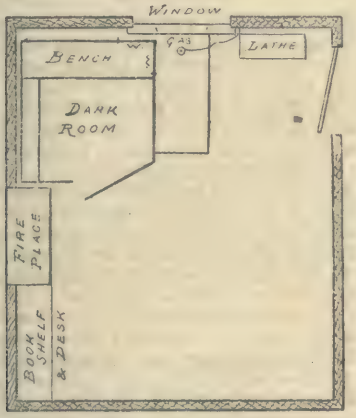
By J. Pike.

During an experience of nearly twenty-five years I have had to work under a great variety of conditions. The amateur with a passion for mechanics and photography is a trying individual—*i.e.*, to every one but himself. He is hustled about usually from pillar to post, cellar, garret, bathroom, and scullery. He is in every one's way. In addition to this experience, I have had the use of various really commodious rooms, and have done good work, and even made very fair dry plates in an out-of-door "sentry box," measuring three feet three square, by six feet six high. It is, after all, largely a matter of arrangement of fittings and apparatus. In the sentry box aforesaid (one of the *portable* variety, which, once put up, can never be got apart again) I had an enlarging apparatus fitted in the roof, the enlarged image being thrown directly on to the work-bench; there was, of course, a small window, and I had gas laid on outside for use if required; by a simple arrangement of zinc pipes the source of light was used to warm the small drying closet in one corner. No dark room is, in my opinion, complete without a drying closet. In addition, there were shelves and poison cupboard, places for all requisites, and, I need hardly say, there was only room enough for one person to work there with any comfort.

Now, I am thankful to say, after many trials and discomforts, I have at last got (to the mere average man and householder) an almost ideal workroom, and I append a sketch of the arrangements. The room is a top back square bedroom, which I have, so to speak, "staked out," and made an indispensible claim to. The window faces north, and there is an uninterrupted view, *i.e.*, nothing to interfere with enlarging operations. In one corner of this room I fixed a dark room or closet. It is really a framework of one and a half inch stuff, covered tightly with canvas, then well papered, first with brown paper, and finished off with

a good wall paper. The door requires careful fitting, but a curtain inside makes all secure. The windows, two in number, are at the corners, (marked w), most convenient for work by daylight or gas. The internal fittings are as usual. Outside is a fixed bench, facing the large centre pane of glass. I find this very handy for supporting the enlarging apparatus. A *shutter* also, with the usual openings top and bottom, completely covers the window when it is required, for enlarging purposes, to convert the whole room into a dark room.

So far, these fittings are of the simplest nature, but each neatly put together, and made, as far as can be, with an eye almost to decorative effect. The great objection to a work room in a private house is the unsightliness, as a general rule, and untidiness of the arrangements, if



what is mostly *chaos* may be termed arrangement. The floor should be covered with linoleum or oilcloth; and plenty of shelf room, with neat and inexpensive curtains to hang in front, will obviate all necessity for litter or things left about. My idea is to make the room a comfortable study, smoke-room, reading-room, and workroom, and on occasions it is (for there is plenty of space) a bedroom. In one corner, next to the fireplace, is a bookcase and desk. Here I keep all photographic apparatus, negatives, and printing paraphernalia, and one can work undisturbed. It is hardly the best place for a *lathe*, but such work as I do in that way is light and easy—a little turning at times, and occasionally some winding, as 'coil' making. The 'bench' is used mostly, of course, for general work—carpentering and joining—but this done, tools put away, and floor swept, a tablecloth covers all this, and I can get to work with coil and battery, and give demonstrations of X-ray work without having to make apologies for surrounding "litter." A good three or fourfold screen is by no means the least of one's requirements in a room of this kind, particularly when enlarging. The dark closet, of course, is fitted, as most of these places are, with plenty of shelves and racks for

dishes and bottles, and everything is ready to hand for photographic work if needful. In addition to the suggestion of comfort in one's surroundings, I am sure the great objection to 'amateur work' in our private houses—objection which naturally comes from the lady of the house—is practically removed, if neatness and order prevail, with an eye to some decorative effect. In other words, make the room *useful* certainly, but also as ornamental as possible.

ON THE CONDITIONS REQUIRED FOR OBTAINING A NATURAL EFFECT IN STEREOSCOPIC SLIDES.

By J. F. T.

HAVING been asked to contribute a short paper to the ALMANAC for next year, I propose to describe the conditions under which a natural effect will be produced in pictures viewed in an ordinary refracting stereoscope. I shall assume that the camera employed to take the pictures has two lenses, and consequently takes small pictures for slides, because when a shifting camera is employed to take the two pictures in succession, the objects must be immovable, and such can be better made the subject of larger pictures for use in a reflecting stereoscope.

It is of course well understood by all who are interested in stereoscopic work that the appearance of *solidity* in a stereoscope is due to our seeing two different pictures, each being appropriate to the eye which views it; the amount of difference is small because the distance between ordinary eyes is only about 2½ in., which is very small compared with the distance of the objects viewed, and we must be careful to preserve this condition if we wish to have a natural representation. Let us consider what would be the result of seeing with the eyes of a giant whose eyes were 5 in. apart, or double the distance of ours: so far as the picture of either eye is concerned, the pictures would be similar to those of our own eyes in the same places, the angles subtended by the objects being the same as to us; but, when we examine the effect of the binocular vision, the case would be different—an object 60 ft. off would be 144 eye-distances from the giant instead of being 288 as to us. The small differences of position in the two pictures would thus be twice as great as to us, and if we could take these two pictures and see them with our eyes, we should see the objects subtending the same angle but displaced by the shift from eye to eye as if at only half the distance from us: the effect would therefore be that of looking at a model on half scale placed at half the distance. Whenever the distance of the lenses in a binocular camera exceeds the distance of the eyes, more or less of this effect is produced, and though, no doubt, in pictures of landscapes (where there are no near objects) some increase of the lens interval is admissible, or even advisable, in order to separate the planes in the picture more, still, this separating of the lenses should be done with great caution, and, in fact, distance without near objects is not suited for stereoscopic pictures. My old camera had the lenses about 2¾ in. apart, and I never found this distance too little, but of course I did not use it on unsuitable subjects. I should think that an interval of 3 in. between the lenses was an extreme amount, but it would be well to have the distance adjustable so that it might be reduced for nearer objects.

In order that the objects in the pictures should subtend the same angles in the stereoscope as they do in nature it is essential that the lens with which they are examined should be theoretically of the same, and practically of nearly the same, focal distance as that of the pair of lenses with which the pictures were taken, and they should admit of some adjustment for the distance of the eyes, so that the directions of distant objects seen through them may be parallel for the two eyes. When the images are so placed on the slide that the distance between the two representations of a very distant object are separated by exactly the distance of the eyes, the lenses may be of the ordinary form, that is, the axes of the two surfaces may coincide, and even if this distance be slightly exceeded, the eyes will be able to bring the images together, but if the excess be material, it is desirable that the superposition should be obtained by prisms of suitable angle. Such prisms, which are virtually introduced into almost all stereoscopes I have seen, should, however, always have a small angle.* Their use enables the pictures on the slides to include somewhat larger angles, but I think that the most natural effect would be produced by lenses of the ordinary form in which the surfaces have a common axis. The best stereoscope I ever came across had lenses very nearly of this construction.

It is not, I think, desirable to have the lenses of the camera and stereoscope of very short focus—about 6 in. is a common one for those of the stereoscope, and I think this is a fair value for general purposes—I do not think that wide angles are appropriate for stereoscopic lenses, because the resulting pictures should, on the principles I have laid down, require wide angle lenses to examine them, and these are not available in most cases.

SUCCESS IN GETTING WARM TONES ON BROMIDE PAPER.

By G. E. Brown, A.I.C.

In order to assist any who have been unsuccessful in using uranium toning, the following brief hints are given.

If the directions given are followed, I think good results will follow.

Several points must have attention, but these once recognised, the method is easy and certain, and should certainly be used by all who wish to make the fullest use of bromide paper. It is the best way of getting a warm-toned enlargement direct.

First as to the developer. Do not use ferrous oxalate. Metol or amidol, either of which gives charming results, is preferable. Be careful not to over-develop or choke up the shadows. Light prints give the best results, especially for the redder tones. To get full detail without excessive density, add water to the developer. Wash well, as usual, before fixing. Fixing must be thorough. This is most important. The bath must be fresh and the prints kept moving. A bath containing two

* In some cases, the lenses, while prismatic inasmuch as they cause the pictures to approach, are cylindrical in cross section, and, in this case, by turning them round in their sockets, the pictures can be raised or lowered with reference to each other. This enables any defect in mounting which makes one picture higher than the other to be adjusted.

ounces of hypo to the pint, in which prints are turned over for fifteen minutes will ensure proper fixation. Wash in running water or frequent changes (five minutes) for one hour; then place for fifteen minutes in an alum and citric acid bath—

Alum	2 ounces.
Citric acid	½ ounce.
Water	20 ounces.

Keep moving in this and then wash in running water for three-quarters of an hour. Meanwhile prepare toning bath. Make a stock solution of—

Uranium nitrate	10 grains.
Water	5 ounces.

This will keep best in the dark. Make also a solution of—

Potassic ferricyanide	10 grains.
Water	5 ounces.

Rinse the ferricyanide crystals once or twice with water, pour off water, and dry between blotting-paper before weighing. This solution does not keep well. It is best to prepare it fresh each time. To make the toning bath, mix equal parts of these solutions, and to every ounce add twenty-five minims of "glacial" acetic acid. Place the print in a white porcelain dish, and keep the toning solution gently flowing over it. The change of colour is gradual from black or grey to red, through chocolate and reddish-brown. As soon as desired tone is reached, remove print and place in large dish of running water. Be careful not to allow the entering water to impinge on the print. This will cause a light patch. The best plan is to admit the water at the bottom of a deep basin by means of an indiarubber tube. Notice that the ground of the print is stained yellow. Washing will remove this. Wash as little as possible; six or seven minutes ought to remove all yellow from the lights. Further washing removes the uranium tone. As soon as clean, remove from water, and blot off all drops of water with a piece of blotting-paper (Robosal is best). Neglect of this will cause patches. A brilliant red tone is got by toning as far as possible in bath, removing the yellow stain, and then placing print in Farmer's reducer, made by making some hypo solution (two ounces to the pint), and adding ferricyanide of potash solution (strength immaterial) until solution is lemon yellow. This takes out the black silver deposit, and leaves the uranium red.

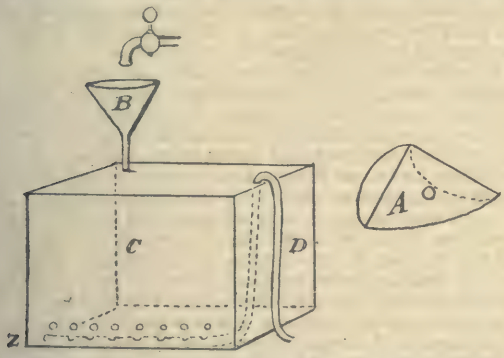
En resumé. The points for success are: (1) Thorough fixing; (2) Thorough removal of hypo; (3) Pure ferricyanide and freshly mixed toning bath; (4) Uniform washing and removal of drops of wash water.

A USEFUL APPARATUS FOR QUICKLY WASHING PLATES AND PRINTS.

By Major C. Gardner Vatcheb.

The following cheaply improvised apparatus will be found useful for washing plates, &c. First procure a cheap, say, threepenny or fourpenny, tin funnel, and should one use, as I do, the Champion rack in an oblong tank, bend a piece of tin to grasp the corner of it, A, in sketch, and bore

a hole in the corner piece to pass the funnel, B, down through. The funnel is to avoid splash. Next procure a piece of compo pipe from a gasfitter, and bend it like D in sketch. Squeeze the end of it, as at Z, to one-sixteenth of an inch, and bore with a bradawl holes as at O. These act as a drainer. It is obvious that the supply of water from the main can be regulated to the amount passing away through the syphon.



In last year's ALMANAC, by a printer's error, my pyro-cum-metol formula reads all wrong by the omission of proper stops. It should read:—Of a pyro 10 per cent. solution use 20 minims; of a bromide of potassium 10 per cent. solution use 30 minims; of a carbonate of soda 10 per cent. solution use 180 minims; and of a solution of metol (Hauff) 50 grains, water 10 ounces, sulphite of soda 1 ounce; use 30 minims and make up to 1 ounce with water.

If the plates flash up, use more bromide and more water. Plates of slower speed require less metol solution.

HALATION AND BACKING.

By GEORGE T. HARRIS.

HALATION is a perennial subject in photographic circles. It is the analogue of *East Lynne* in dramatic economy; when all else fails, produce the subject of backing, and the hum of approval that goes up from the photographic world testifies to the popularity of the theme. At first sight it would appear that the man who should discover an effective remedy for the evil of halation would come dangerously near being canonised. This is not so, however, as a little deeper reflection will prove. His name, on the contrary, would be held up for objurgation into the third and fourth generation as having destroyed one of the pet topics of a photographer's life. Blessed be halation!

This year the microbe of halation has been unusually active, having early in the year attacked the plate-makers, prompting them to issue ready-backed plates, which have proved a royal battle-field for belligerent backers, and causing a ferment in the photographic world, as is the wont

of microbes generally. To my system also came this bacillum in due course, whereupon I got me to a dealer and purchased many dozen 'ready backed,' as set forth in the advertisement, taking them and a hand camera for a yachting cruise on the Norfolk Broads. I photographed the rising sun, the setting sun, and views against the mid-day light, but no trace of halation did I get, and I said, '*Requiescat in pace*, halation. Halation is dead!' Some day, when the urgent business of life is over, I shall remove the backing from those negatives and print from them, and give the companions of that voyage the prints they are now wondering why they don't get—if they are alive.

And yet collodion is a perfectly manageable and convenient backing when of suitable construction. Several years ago, when photographing one of the English cathedrals, my supply of backing became exhausted, and none of the photographic dealers stocked such an article, so I went to a medical friend, who supplied me from his surgery with a pound bottle of collodion and some fuchsin from his case of stains. The collodion was very thick, more so even than the ordinary enamel collodion, and I diluted it with an equal bulk of ether and alcohol, adding the alcoholic solution of fuchsin until the colour was deemed preventive enough. As a backing it left nothing to be desired. Some difficult windows of the cathedral were rendered quite free from halation, and it was removed from the plate after development in the readiest manner possible; being tough and leathery, it came away in pieces of two or three inches square. A dozen or more 10×8 and 12×10 plates were coated at night and left exposed in the developing tent for the solvents to evaporate, then the slides filled with them. There was absolutely no trouble either in applying or removing the backing. Clearly collodion as a backing is not at fault when properly used, and I gave up its use not from any inefficiency or trouble in manipulating it, but that when Forrestier's backing in collapsible tubes was introduced, I could not resist the convenient and portable way it provided for the landscape photographer to carry with him a supply of backing that could not come to grief or make itself a nuisance by leaking or evaporation.

But is backing a necessity for the average landscape subject? With the average commercial plate I am willing to admit that it is; that, indeed, it is almost a paramount necessity if the best results are desired; but with plates of home preparation, where the thickness of films is under the control of the user, I am convinced that for nine-tenths of landscape subjects backing is a merely superogatory operation. Some years ago I discussed this point with the late Mr. William Bedford, who was one of the most reliable and exact workers it is possible to imagine, and he gave as his conviction, from practical experiments in the field, that with plates having generous films backing was not only unnecessary, but in point of fact inoperative. Such a remark, I would like to repeat, applies only to the usual landscape subject, and not to glens, where bright sky appears through the interstices of foliage, nor to interiors with difficult windows; in such subjects one would naturally provide against the contingency of halation. Mr. Bedford's test was a very simple one, and appears to me a thoroughly conclusive one too. He coated half a plate with backing, exposed it, and, after development, criticised the finished negative, when it was impossible to say which half of the negative had been subjected to backing.

Very few commercial plates would, I fancy, emerge successfully from a similar test; they are far too thinly coated for such a trial. The plates I am referring to had the necessary opacity well established by the time the faintest indication of skyline had made its appearance at the back of the plate. The tinge of colour imparted to the film by the orthochromatic agent was also a further means of securing immunity against halation. With the majority of plates with which I am acquainted, the details of the subject are readily discernible at the back of the plate by the time development is finished. Common sense dictates that with such a plate as this brilliance of image is not to be expected unless backing of some kind be applied. Some brands of commercial plates, especially of the so-called 'ordinary rapidity,' are notable exceptions to the thinly coated plates that are usually distributed, and, with the price of silver so low as it has been for a long time now, there would seem no valid excuse for refusing a more generous supply of emulsion to each plate.

In a recent issue of a photographic paper was an article illustrated by views of a ruin well known to me from photographic experience. Each one of the views, and there were some half-dozen of them, had the upper parts of the building almost lost in the sky by severe halation, and yet the photographs had the appearance of having been taken in a good light and correctly exposed. They were subjects upon which I certainly would not have used backed plates; in fact, having photographed the identical views, I can conclusively say that, with a good plate, backing would be absolutely unnecessary. How the author of them managed to secure the amount of halation he did is a puzzle to me, and my inference is that it was entirely the result of using a thinly coated plate unbacked.

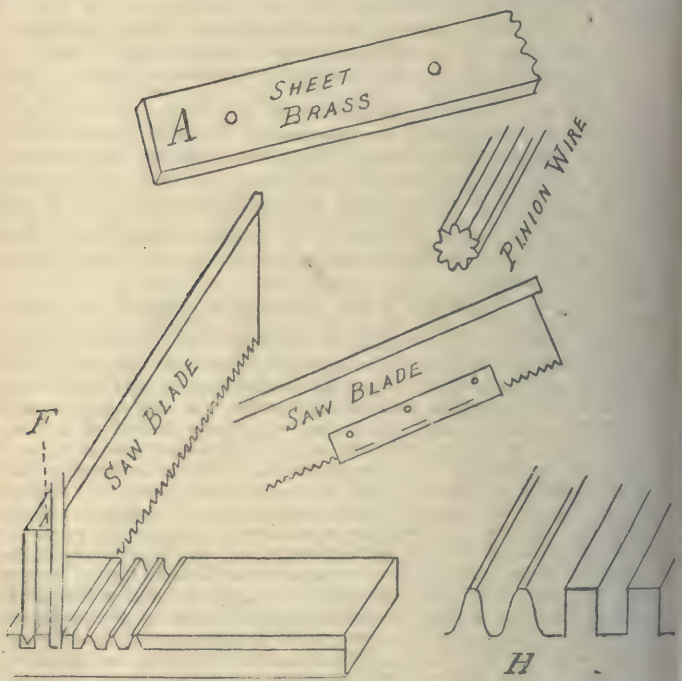
The trouble of backing a few plates when required for special subjects is so small, and in a professional business comes so incidentally, that it is really scarcely worth consideration, and the man who magnifies such a trifle until it becomes an incubus in his photographic life stands self-confessed as either an incompetent or very lazy worker. With a well-made caramel and sienna backing, like the one previously mentioned, a dozen 10×8 plates can be properly backed in as many minutes. Squeezing out sufficient quantity upon the plate, it is evenly distributed over the back with one of the small hollow indiarubber balls sold at toyshops, a piece of brown paper, cut rather less in size than the plate, is pressed in contact with the backing, and the plate put at once into the plateholder. If development takes place at once, the paper can usually be peeled off without any difficulty, and the backing may either be removed with a damp sponge or allowed to dissolve during development. On the other hand, development may be deferred as long as desirable without the backing and attached paper becoming unmanageable; all that is necessary is to take care, when developing, that the developer has access to the back of the plate, and, before density is obtained, the paper will be easily stripped from the plate, and the backing so moistened that it at once becomes incorporated with the developer. I have treated hundreds of plates in this manner, and without the convenience of a properly appointed dark room, yet the 'trouble and messiness of backing,' chanted with such wearying persistence in photographic circles, have failed to make themselves felt more prominently than any of the other minor operations in photography.

BRASS RACKWORK.

By R. T. Baxter.

Every year it becomes more and more difficult to find fresh contributions for the annuals; however, here is something that amateur camera-builders will find extremely useful, and economical for their pocket at least—that is, making their own rackwork.

Obtain from a watchmaker's dealer a piece of stout pinion wire of the size required. On the top of every one of the teeth rub a little ink; common ink will do. Now run or roll the pinion wire over a piece of clean writing paper, so as to leave an impression of the width of the



teeth or pitch, as it is mechanically called. Now find the exact width or space between any two teeth, file out a piece of brass exactly to this width.

Shape out a piece of brass or iron like A, with the V-shaped edge. Now measure the depth of tooth of the pinion wire, and rivet the first piece of brass in between the saw blade on one side and the V-shaped

piece on the other side, *that is, the outside.* The F piece of brass represents the thickness of tooth of the pinion wire, and the V-edge piece of brass is to act as a gauge to give the width of tooth all through.

The piece of brass, F, is not so wide as the V-edge; simply to act as a gauge for the depth of tooth.

When all the teeth are cut with the saw and gauge, obtain a watchmaker's three-corner file to fit the space as near as you can, in between each tooth of pinion wire.

Fasten the rackwork down to a nice level piece of planed wood, and proceed to file the teeth (as shaped in sketch H) in straight strokes very carefully. It is not a long job, and, if carefully done, will amply repay any one for the trouble taken. When rivetting the pieces of brass to the saw blade be careful not to buckle the saw.

ON THE FADING OF SILVER PRINTS.

By A. L. Henderson.

'An unfortunate advantage.'

Here is a photographic rendering of the above adage. Having lately removed to a new residence, where I have a different supply of water, *i.e.*, permanently hard well water, for a time my photographic operations were completely upset in consequence of the water. Gelatine prints would fade before my eyes. This fact led me to theorise and experiment. The results will go a long way to account for the fading of prints. For example, if I take a gelatine print directly out of a compound toning bath, and place it in a fresh fixing bath, it will speedily darken in tone, and the whites will get degraded. This is caused by a decomposition between the salts of the toning bath and the new hypo. If the print is well washed in pure water between the toning and new fixing, no apparent alteration takes place unless the hypo is too strong. Here there is a probable explanation why some prints fade more than others. I don't want your readers to think that this peculiarity is due solely to the double toning and fixing bath.

I believe that the bath just named is the best of all known methods when properly used.

Moral: Use pure water for all operations. If not, use a small quantity of pure water before and after each operation. This latter procedure will remove the bulk of injurious chemicals.

THE SKYLIGHT AND "THE JOURNAL."

By W. Girling.

Seeing the numerous answers to correspondents requiring advice upon studio building during the past summer, which have appeared in the Journal, I judge the erection of such buildings is on the increase.

Having worked in one for more than thirty years, and been indebted to writers who related their experiences in former year-books, I will, with your permission, give a few plain directions upon the best plan of keeping out the wet—a very important matter.

The pitch of the roof, all things being considered, should be at an angle of 45°; this shoots the water best, is easier to repair than more upright ones, stronger than flatter roofs, will give more light, and be better under control. The space between the rafters should not be less than twelve inches, and need not be more than eighteen. Greater breadths require stronger rafters; thicker and more expensive glass. The most economical pane is one third longer than the width.

When contemplating building, altering, or repairing the lights, the edges of the glass next the rafters, both above and below, should, a week beforehand, be painted; any colour will do, using boiled oil; let this get dry before using, see that the outer edge is covered also a quarter of an inch on the pane, the putty will then adhere firmly to the glass. This should be made of linseed oil, not fish oil, the builder will tell you the latter is as good as the former, and we always use it, &c. Do not believe him; *price* is at the bottom of such remarks.

The panes are best cut thus:—

If it be a foot wide, cut off a piece at each side five and a half inches long, half inch wide at the edge, tapering to a point towards the centre, leaving about an inch straight in the middle, this will cause the water to run down the centre and away from the rafters. Bevel the inside edge of the rafters. Let the rabbets be well painted and dried, and not less than three quarters of an inch deep, otherwise you will not have sufficient space for the putty when you reach the top. Before putting the glass in position, have in readiness some strips of zinc one and a half inches long, quarter wide, fold them in half, then, with a pair of pincers, bend the end over one sixteenth of an inch to form a little hook to hang on the top edge of the first pane at each side; spread the putty on the rabbets, let it be tacky, lay the pane in position with a brad at the bottom to prevent slipping, put on the hooks and proceed with the second pane, let the slanting edge cover at least half inch of the first pane, this air space serves for ventilation, cleaning, carrying off the water of condensation within, and prevents the water ascending by capillary attraction; finish off with good putty, and let it be painted before it gets dry—this makes it adhere to the glass more firmly. The end of May is the best time for this work; go over it again in the middle of August, filling up any crack with putty and paint, and you will be safe for the winter. Let the light have these two visits annually in dry weather—it is the most economical plan. See to this personally yourself. It is your light, you have to pay, and it is for your comfort. The workman will say "All right, sir, I understand." So he may, but frequently you find something not quite right; a crevice or two into which a pen-knife will go, and the wet too.

Should the light be too strong for your work, coat it with oiled tissue paper, as Mr. Blanchard suggested last year, I prefer it on the outside. The hail-stones do not damage the glass so much; it is cooler in summer and warmer in winter. The light is soft, nicely diffused, and of good quality.

THE BRITISH JOURNAL OF PHOTOGRAPHY.

First, there *is* such a thing in existence; second, take it; third, read it; fourth, lend it to some one who cannot buy it.

Last spring I sent my assistant to a west-end emporium for a certain article, and he was told they knew nothing of it; a like answer was given

at a second one, and yet it was prominently and frequently advertised in the JOURNAL; evidently the young men do not read it, perhaps do not see it, or any other. Now, would it not be well if employers placed it within reach of their young people after business hours? I like to be served by one who thoroughly understands his business, which cannot be done by uninformed persons, it is also much better for the employers.

I look upon the appearance of the JOURNAL as a regular weekly treat. I receive it on Fridays six p.m. After finishing the day's business, I sit down for rest and a comfortable read. It is always interesting, very instructive; often I read articles upon subjects I want to know a little more about, and not infrequently very amusing.

I look at the portraits in the Convention group and identify some of the contributors. What old friends some of them are now, others are like a good picture. You wonder what is going on round the corner; so we wonder who is Mr. Cosmos—what is he like; Free Lance, and Dogberry, with his frisky barking ways; and the writer of the delightful letters to Richard; and a host of other good names you see in the reports of Society meetings. This, and much more, is to be got out of the JOURNAL. It grows upon acquaintance; the more you read it, the more you value it. I would strongly recommend every one who practices photography to take it regularly; it will give good interest in every way you look at the subject. Probably the ALMANAC goes where the JOURNAL does not, hence 'this thusness,' as Artemus Ward used to say.

PLATE BACKING—FOG REMOVING.

In *practice*, the usual sienna and caramel backing answers well. Pour off the liquid, dry the sediment, then take a little of the latter in a saucer, pour on some methylated alcohol, and with a brush paint over the back of the plates; never mind the streaks but *cover* the plate, a thin coating will answer; it dries quickly, does not rub off, and is easily removed with a wet sponge.

This will also prevent the plates from being fogged at the back during changing operations, a slight fog from light reaching the front may be removed by bleaching with chromic acid as given in the ALMANAC. When well washed, redevelop it to the required density with the usual developer employed.

A COMBINATION DODGE.

By REV. T. PERKINS.

MANY of us would like at times to turn out a picture larger than the size of the camera we possess, and this we can, in certain cases, do without resorting to enlarging from the negative, a process which requires apparatus that perhaps we may not have.

There are certain subjects which make admirable pictures when arranged on a plate used upright, the lower half being occupied by the landscape, the upper by the sky. Any one who has seen Mr. Horsley Hinton's *Day's Awakening* and *Day's Decline* will know the kind of subject to which I allude. No terrestrial object in such pictures rises far above the horizon, and it is evident that the lower half might be taken

on a plate placed horizontally in the camera, the lens being lowered by means of the rising and falling front till the horizon is nearly at the top of the plate, only a strip of sky some half-inch wide being included. When this exposure has been made, should the sky be one suitable for the subject, the lens can be raised so that the horizon is brought within about half an inch from the bottom of the plate, all the rest being occupied by sky and clouds, the same lens and probably the same or a larger stop being used, and a shutter exposure being given so that the sky negative may not be overdone. Should, however, the sky not be suitable, a sky negative may be made on another occasion in the same manner.

When the two negatives are secured, it remains only to make the print. A printing frame somewhat larger than twice the size of the negative must be used, either one of the box form or one of the ordinary form, in which a sheet of glass has been placed for the negative to rest on; a 10×8 printing frame will do admirably if the negatives are of half-plate size. A sheet of paper of the desired size must be placed on the landscape negative, the upper part being carefully marked down to the horizon, and the landscape printed on this; then the sky may in like manner be printed from the sky negative, the landscape already printed being shielded from the light.

All cameras are made with a rising front, so no difficulty will be met with in getting the plate intended for the sky portion of the picture almost entirely occupied by the sky; but many cameras, my own included, do not admit of the lens being lowered. To obviate this difficulty, I always have the front board so pierced for the lens flange that the lens, when the front board is in its normal position, is decidedly above the centre, so that by taking out the front and turning it upside down the lens will be brought below the centre, and, if the axis of the lens is kept horizontal, the horizon will be high up on the plate.

NEGATIVES WITH CLEAR GLASS, EXPOSURE TABLES, AND 'REVERSALS.'

By F. H. Varley.

The above heading seems somewhat mixed, if not meandering; but I mean to go through with it as straight as the trajectory of a Bisley bullet busily buzzing on to the bull's-eye (to use a phrase inspired by a stay in the military port.) Down at Hythe, about a mile from the seashore, negatives with clear glass in the darkest shadows, full of detail from foreground to clouds, can be obtained from short exposures and correct developments. I say short exposures advisedly, because a series of four negatives, taken in rapid succession—one, the $\frac{1}{10}$ of a second; second, the $\frac{1}{25}$ of a second; third, $\frac{1}{50}$ of a second; and, fourth, $\frac{1}{100}$ of a second; all of the same subject, the lighting of the landscape being unchanged—yielded, under development, four negatives of remarkable uniformity, with the exception that the $\frac{1}{10}$ of a second and the $\frac{1}{100}$ of a second's exposure were a little nearer alike in density and detail; so this leads one to the conclusion that it is development that does it, or, rather I should say, the correct judgment and manipulation of the operator.

The *modus operandi* is something like the following: For success use

a developer of normal strength (soda pyro for preference), and stick to it 'in spite of all temptation;" learn what you really can do with it—the first appearance of any developed image (down here) is from fifteen to twenty-five seconds; with the same developer and same make of plate in London, from thirty-five to fifty seconds. I think the extra rapidity of development at Hythe is due to moist salt air. Complete development is reached in about two and a half to three times the first appearance; but do not trust to time measurements, but watch carefully the progress until all but the very darkest shadows are developed. At the very faintest hint that these are about to veil, smartly immerse the plate in the alum bath and arrest further action; after resting in the alum bath for a minute, remove it to a second alum bath, in which let it remain two or three minutes; then well wash and put it into the fixing solution; when left sufficient time to thoroughly clear, wash for two hours in running water. The resultant negative will be a quick printer, and those who work with denser negatives will be surprised how very rich these negatives are in the proper graduation of the whole range of tones.

Exposure Tables.—Now, from the fact of the range of exposure being a bit wide, I was led to place some confidence in an exposure table. Accordingly, turning to September, I found that for *f*·14, 'Three o'clock afternoon, open landscape, with sunshine, forty times plate' (whatever that may mean), time of exposure is given at $\frac{1}{4}$ of a second. Having a shutter which is speeded to the $\frac{1}{16}$ of a second, I set out to photograph St. Leonard's Church, as seen over the fields, camera facing eastward, also to get two views much nearer of the same church. On development of No. 1, to my surprise, first appearance began at ten seconds and the whole flashed rapidly into view. Naturally thinking that the darkened portion of the negative was the sky, I looked out for what I thought land and foreground; just when it was too late (forty seconds in the developer) I discovered it was a reversed negative. The sky now had darkened; I then arrested development with the alum bath; had I have removed it at thirty seconds, I believe I should have had a perfect diapositive; but the result, after all, is even more interesting, for, after bringing the reversed image, it has made a feeble attempt to recover itself and to behave as all well-regulated and properly conducted negatives should do. The result is a positive and negative superposed, this being especially observable in the case of the trees; the tops, the most lighted, remain reversed, whilst the centre, shadows, and stems are more negative, and between these all is muddled and mixed. So much for exposure tables. You can pretty well judge the amount of faith I am inclined to place in them when one sixth of the time they tell you produces a reversal.

Two days later I went, accompanied by my nephew, to photograph the breakers as they dashed against the sea wall at Sandgate. We were armed with a half-plate hand camera, with twin lens and brilliant full-size view-finder.

In the enthusiasm of the work I directed the camera westward, and took two pictures. It was whilst waiting and watching for a good display I became so engrossed as to allow the sun's image, mirrored by the waves into hundreds of gleaming facets, full play upon my eyes. Result, a martyr to the cause of science, a bad attack of ophthalmia, accompanied with neuralgia, *hors de combat* for three weeks.

Moral.—Never use brilliant full-size view-finder twin-lens cameras without tinted spectacles, lest, in an unwary moment, one should be led to do the same kind of foolish trick. I, however, still consider the makers of these instruments very much to blame in not cautioning users; or, better still, to supply a blue or dark-tinted glass screen for use on similar occasions, or when photographing snow or white chalk cliffs reflecting a dazzling brilliancy of light.

Twelve views were taken in all. The camera shutter was timed for $\frac{1}{50}$ of a second, the remaining ten being taken by my nephew. The negatives all show reversals, or partial reversals, though 'Ordinary' plates were used, the white spray printing out like smoke or dust, and in this respect there is scarcely any difference between the negatives taken with camera facing east or facing west. Facing west the spray obscures the light, and should look dark, but, with camera facing east, the spray was of a snowy whiteness, the sun being in the south-west; nevertheless, the spray prints out even darker, due to the effect of reversal.

A TRIP TO THE PYRENEES.

By Major C. Gardner Vatcher.

Last spring we went over part of the ground we had previously visited, namely, Biarritz and its environs. From thence we made our way to the Pyrenees. Passing Pau and Lourdes, we arrived at Argeles, which we made our headquarters. The scenery is lovely and the climate is delightful. We were there at the beginning of April, and the snow had not quite cleared off the mountains, but the trees in the valley were in full leaf.

Amongst the many things to see and photograph are the ruins of several castles, said to be built by, or occupied by, our Black Prince. The castles of Beaucens and Luz are the finest, and they are perched on the tops of conical hills, of course at some distance from each other. Each is built to command that particular part of the valley, and the means of access to them is difficult and well guarded, there being sheer cliff all round except at the entrance.

On our way thither our driver was put through his paces as to who the Black Prince was, and his history was like that of Bill Adams, new and startling. For instance, he was called Black because he was a nigger. His antagonists were whites, and he lived about hundred years ago, or about the time of the great Revolution.

Quite close to Argeles is the small village of St. Savin, picturesquely situated at the top of a hill, and where there are several things worth a plate, such as an old church, a fountain, and some old buildings. There are several nice walks into the mountains, but the river scenery especially took my fancy. One drive we took, *viâ* a small place called Pierrefitte, was to Cauterets, a sulphur-bathing station, much patronised by the French in summer for skin diseases. It lies in a hollow at the foot of some mountains some 1500 feet above Argeles. So shut in is it that very little sun seems to shine there, and, when we were there, seemed particularly depressing, as the long, narrow streets were void of

life and the shops were shut up. The road up was very fine, and at every bend for some distance one caught glimpses of the Argeles valley. Like most of the French mountain roads, it was cut out of the mountain side, and is well engineered. The gorge down which the Gave de Cauterets roared was very grand. On the way up is a silver mine, with some wonderful machinery now going to wreck and ruin, as the Company, said to be an English one, do not now work it, as silver is so low.

Another drive we took to the famous Cirque de Gavarnie, going up one day and returning the next Part of the way is over the same road as to Cauterets, through Pierrefitte. The valley narrows just after this place, and the road is cut out of the cliff side, with the river at its right, and the cliff again bounding the river; but just before Luz the valley widens again. The cliffs all along the road tower above one.

At Luz there is a remarkable church, said to have been founded about the twelfth century by the Templars. It is peculiar in that it is fortified and surrounded by regular defensive works. A small chapel, cut off from the rest of the church, was said to be for the lepers, of whom there were said to be a large colony in those days. The Romanesque porch is well worth a photograph. One of the two towers served as a kind of keep, whence the watchmen on guard could see the approach of their enemies. From Luz the road leads past St. Sauveur, another thermal station, consisting of a long winding street, to which the French resort in summer. The gorge is crossed by a very fine bridge just above the village, the river being some hundreds of feet below. Further on, several villages are passed, quaintly perched on promontories above the road. The last small one before Gavarnie rejoices in the name of Gedre, and is usually made a resting-place for the poor horses. There is really nothing to see there, and, although they pretend to have a wonderful grotto to show you, it is only an attempt on your pocket. The last mile of the road leads past what is rightly called Chaos, that is to say, what one's ideas would lead chaos to have been. Part of the mountain-side has dropped, and huge blocks of stone almost as big as houses lie piled one on top of each other, or so poised that one would think it would take very little to bring the whole lot hurtling down on top of you. Of course the famous Roland has left his mark here as in other parts of the Pyrenees. You are shown his horse's footmarks imprinted in the rock after having leaped from the top of the mountain. The Breche de Roland, so tradition says, was hewn in the mountain by one cut of his sword in order to get quickly from Spain into France. We now get a first view of the Cirque, in form a big horseshoe, with three terraces, each rising a thousand feet above the one below.

As soon as we got to the hotel we could see that, save in big heaps, the result of winter drifts, the snow had all melted, but they told us that, although on most of the mountains around the snow was all melted by summer-time, yet there were always unmelted glaciers on the terraces of the Cirque. Luckily, as soon as I had made all the arrangements for our stay, I made my way up to the foot of the Cirque, and saw nearly all there was to see, but the other members of my party delayed till the next day, with the result that all they saw was from the carriage when coming up. Soon after we had started dinner it commenced to sleet, and turned in bitterly cold, so that we were very glad to have good fires

in our rooms, and all the wraps we could on our beds. The next morning the ground was white with snow, and it did not cease snowing till after our journey half way to Argeles, and by the time we got there it got quite fine again.

Altogether, I spent a very jolly time of it, and brought home lots of plates developing into very successful negatives, and can thoroughly recommend a trip to the Pyrenees.

HOW TO MAKE METAL SHEATHS.

By JOHN ROSS.

SHAPE out a piece of sheet iron or brass the size of negative, the sheaths to be constructed for. Obtain from Fallowfield's a ferrotype plate, and mark out on the ferrotype plate the size the sheath is to be, allowing half an inch, both in length and breadth of sheath, than the brass plate for turning



over. Now proceed to turn over the edges all round (except the top part for the insertion of the dry plate) the brass or iron plate. When the edges are turned down, get a piece of very hard wood, and lay down on the edges of sheath, and beat down with hammer.

The sheath, with the plate extracted, should appear nice and flat like sketch.

AN EGG SHELL USED AS A PARABOLIC REFLECTOR.

R. L. Maddox, Hon. Fellow R.M.S., Hon. Member Amer. M.S., &c.

For more than a year this particular egg-shell had been saved, trusting some day to test its value as a quasi parabolic reflector, and now forms the subject of the present contribution in answer to the Editor's appeal. To state that this is the first time an empty egg shell has been put to such use would be to hazard contradiction, hence that point can be waived.

An old egg-shell is rather a ticklish object to shape for adaptation to a microscope objective, but it was accomplished after the following manner. A circular piece of stout brown paper, and also of fine black cloth, had each a hole punched out of the centre, the size of the front of the brass-work of the objective to be used; each piece was then deeply notched from the outer edge towards the central opening. A circle was now drawn on the outside at the end of the shell, and of the same size as the hole in the paper and cloth. After well wetting the brown paper and damping off, some strong glue was spread on one side, and it was then placed on the shell, the circle and aperture coinciding. The cloth with its lappets was then put on over the paper in the same way, and both were allowed to dry on the shell. A central aperture had now to be pierced in the shell, and its outer edge cut down; the latter was managed by carefully snipping the edge away to the required amount. The shell was next held up to the light, and a pencil outline of the outer circle made on the inside of the shell. With a small drill, holes were then made all round just within this circle, and the central piece pushed out; the edges were finally smoothed off with a straight half-round file, and finished by a fine rat-tail file, so as just to admit the nose of the objective.

It now remained to fix a tube to the protected shell, so that the little reflector might slide on the tube of the objective A strip of stiff paper was rolled round the tube of the object glass and glued up, so as to form a stoutish tube, and allowed to dry on it. When dry, a pencil line was marked round the tube midway, and the front edge notched to the depth of this line; the little leaflets were then pressed back over the rounded end of the handle of a large chisel, and thus forced open equally. They were then smeared with glue on the inside, and fitted on over the outer coverings on the shell, the objective being pushed into this paper tube, and its front allowed to just project centrally through the circular aperture made in the shell, and the whole allowed to dry.

On testing this arrangement on a small object, it was found necessary to remove more of the outer edge of the shell, so that, when in focus, the shell should just touch the slide on which the object was to be mounted. Two small circles of black paper were fixed to the centre of an ordinary glass slide opposite each other, one on the upper, the other on the lower surface, to form a dark background; the object, a small brittle star—*Ophiocoma neglecta?*—being centrally attached to the upper black disc by a tiny touch of gum. Unfortunately, in spite of every care in placing it down by using the tip of a fine feather—forceps being out of the question—so brittle was the dried skeleton that many of the minute calcareous particles became accidentally detached, and remained adhering to the surface of the paper, consequently they show in the negative.

The little reflector being ready it remained to test it; hence the microscope was placed in position, and a quarter-plate camera attached at the eye end, daylight being reflected from the plane mirror. The whole apparatus, except the mirror, was now covered with black velvet, but the definition of the image on the greyed glass appeared scarcely satisfactory. Direct sunlight was next tried, but from the position of the arrangement it had to be reflected from a secondary mirror, with ball and socket joint, on to the microscope mirror. The eye-piece was removed, and the image again carefully focussed. An ordinary plate was then placed in the slide, and an exposure of thirty seconds given. The image was very slow to appear under development, but when fixed and washed gave a really fair negative, considering the rough centering and the method employed. It was found advantageous to entirely exclude all stray light from the one inch objective, which was used in the experiment, and naturally the same objection would apply to this device as applies to the ordinary highly-polished metal parabolic speculum, that shadows are not well marked; this, however, is often obviated by covering half the speculum with black paper, which might also be done in this case.

DEVELOPING CINEMATOGRAPH FILMS.

By E. A. Robins.

As fairly cheap machines are now upon the market for taking and projecting the 'animated pictures,' a few hints on their development may be found useful. Make a rectangular frame of hard wood, 18 inches by 21 inches by 2 inches, and well soak in paraffin wax. This will take 40 feet film of Edison's standard size wound spirally upon it, the ends being fastened by drawing pins. This is placed in an ordinary deep dish the film being prevented from touching by means of small blocks at the ends. The following developing solution has been found to answer very well for most films upon the market, and can be recommended:—

Metol	400 grains.
Hydrokinone	400 ,,
Sodium sulphite	12 ounces.
Sodium carbonate	8 ,,
Potassium bromide	140 grains.
Water	240 ounces.

The above can be used over and over again if, between times, it be kept in a stoppered bottle. If the developer acts too rapidly, dilute with water but do not prolong development, as stain and fog must be avoided at all costs, a bright negative inclining to hardness being most desirable. The film may be left upon the frame through all the usual operations, and is very convenient to handle. Fix in 20 per cent. hypo and well wash, and before drying soak for a few minutes in a 4 per cent. solution of glycerine to prevent the film drying horny. Development can be carried out by soaking the film in water, and then placing in a dish in half the developer and having another containing the remainder, the film being passed from one to the other alternately. This is simple, but is liable to lead to dam

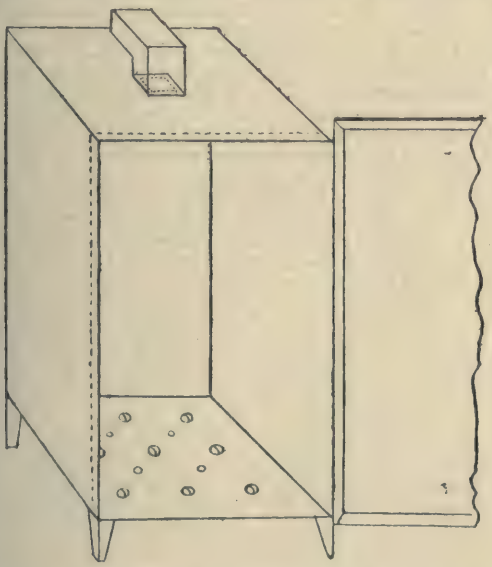
of the film. Intensification and reduction can also be carried out on the same frame, mercuric chloride for bleaching and ordinary developer for blackening being most recommended, and the ordinary ferricyanide reducer.

CARBON TISSUE DRYING BOX.

By Geo. W. Valentine.

One of the greatest obstacles to the carbon process in sensitising the material at home is some simple means of drying the tissue in a satisfactory manner in a few hours. Here is the way then.

Construct a box with light-tight lid, as per sketch, the bottom to have four pieces nailed on the bottom at the corners to raise it off the ground,



so that plenty of air can get in through the air-holes, as illustrated. Sensitise and squeegee the tissue to thin slabs of vulcanite or polished plate, and hang on lines tightly stretched across from side of the interior of box; or some narrow shelves can be formed on the sides and back of the drying box, according to the worker's ideas and requirements. When full, close the door, and in five or six hours the tissue will be ready to strip.

The elbow ventilator on the top explains itself. This box answers capitally for drying bromide prints.

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IN QUEST OF AN X RAY.

By W. Mathews.

Viewed from the standpoint of an uninitiated novice, it would certainly appear that the one all-important and indispensable adjunct for the evolution of an X ray is a Crookes' tube. Yet, upon more mature reflection, it commends itself to the front as an open question, whether, in Nature's laboratory, and in some more or less potential form, an X ray has not also an independent and normal existence. Might it not, presumably, be evolved, or its presence demonstrated as an actual function, or as a constituent element of ordinary sunlight? Ought it not to be experimentally sustainable, affirmatively or negatively, that these rays operate universally as a primordial element of light; or are they but an artistic creation, which has now, for the first time, originated potentialities which were previously non-existent?

It might be—it is fairly possible—that an X ray is but a manufactured article—an evolution of penetrative activity due to the virtues of this especial apparatus. This would relegate an X ray to much the same category as some other manufactured article, to wit, a soap—an artistic *combination* of fatty acids with alkaline or metallic salts. But is it, in this sense of the term, a manufactured article; or, is it not, rather, a natural element of light, as oxygen, for example, is a natural element of the atmospheric air? Is it in the main an artificial product, or is it not such another constituent of light as those which were revealed to the first experimenter with the refrangible properties of a glass prism, when the white sunlight was first observantly dissevered into the three primary colours? That is the nature of the issue here raised.

There is an intrinsic improbability in the surmise that, until projected from a Crookes' tube, the X ray does not exist. More reasonable is the surmise that, more or less potentially, it operates as a function or else as an element of the sun waves everywhere. Nevertheless, that the energy of an X ray is greatly enhanced by the intervention of a Crookes' tube, might go without saying.

Shall we not assume, then, as the more rational hypothesis, that an X ray is an intrinsic constituent of light, and is qualified to exert its power wherever the conditions are sufficiently conformable. If such be the case, we may look for results more or less pronounced whenever the proper concomitants of X-ray activity are present. If it cannot reasonably be held that these rays are special to a Crookes' tube only, then, doubtless, they are performing some function, or making their influence felt in a hundred ways yet to be traced out.

In any case—whether operating universally, or whether local to the Crookes' tube in particular—nothing need here be said explicitly of their primal nature and origination. There are questions concerning the differing velocities of wave motion—and which differing velocities, it is alleged, constitute the real source of certain differing activities—as those which subsist between light and electricity, and, not unlikely, of the X ray. Differing velocities may account for much, but it would be too feebly narrowing the inquiry to be content to attribute the whole phenomena to that one explanatory *dictum*. A differentiated velocity might possibly be an ultimate fact connected with the origin of the

X rays. But the hypothesis in no way helps to solve the question of their everywhere potentiality—*minus* the intervention of a Crookes' apparatus.

And, again, if it be really one of the essential elements of sunlight, the interesting inquiry before us is this, To what extent, and by what means, might it be educed and isolated? Who will discover for us a prism that will accomplish that for the X ray that a crystal prism does for the primary colours and for spectrum analysis—a prism, to wit, that will discriminate between the differing velocities, and refract them into their natural sequence upon, perhaps, an efflorescent screen? Yet, mayhap, a Crookes' tube is the sole equivalent of such a prism.

But, in the interim of such an appliance being forthcoming, where shall we turn to trace out the possible—the normal operations of the mystic rays?

The action of sunlight, considered merely as an ordinary effluence, is known to us all, and is everywhere visible—in the vegetable world, in the studio of the photographer, and in the laboratory of the chemist. But, in the *arcanum* of Nature, it would seem to be but a little less essential that there should be also a more potent and penetrative agency—an agency that diving beneath cutaneous surfaces, would awaken vitality in wombs, and ova, and interiors that are inaccessible to unassisted daylight.

It may aid us in our quest to note some ascertained result of the X-ray activity when it is projected from a Crookes' tube; and, as an apt illustration of what an X ray can do physiologically, nothing can be more suggestive than the disagreeable experience of a practical expert, whose frequently occurring exposure to the ray culminated in results that he had good cause to remember. In the pages of *Nature* he fully detailed what had happened to him. Upon the parts affected by the rays the effect was such that the cuticle scaled off to an alarming extent, and even the finger nails were similarly affected, and ultimately came away also.

Arising out of the novel experience of this well-qualified observer, an obvious suggestion presents itself. It is, that in the realm of natural history the X ray is in potential attendance upon those members of the animal world who are in the habitual practice of shedding their integuments and periodically parting with their cuticles.

Desquamation, when originating in disease, is an unsightly and unwelcome superfluity; but, to the family of crustaceans and of various reptiles, it is a frequent and periodic necessity. To admit of their expansion into the adult stage, it is necessary that the crustacean should from time to time divest himself of his coat of mail. Volition or instinct would be wholly incapable factors in the matter unless adventitious aid came to the assistance of the creature. The X ray, as we have seen, is sufficiently potent to bring about the needed result, and with the *minimum* of inconvenience enable the crustacean to rid himself of his old suit. It is significant, too, that with certain of the reptile class even the outer coating of the eye is thus shed, and that, until the operation is completed, partial blindness ensues; and it is here scarcely possible to refrain from the suggestion that, in instances not a few among persons who are blind, the mere intervention of an opaque film might be the sole source of the mischief. To such persons the desquamation that might be effected by an exposure to the rays of a Crookes' tube should prove to be an efficient remedy.

But, to return, do we not find here food for reflection? These inhabitants of the animal world that thus habitually desquamate their skins and, so to speak, their finger nails, do they not derive assistance from the normal action of an X ray? Crocodiles, lizards, vipers, and crustaceans generally, walk out of their skins with comparative facility. Are, then, their hides more permeable or less permeable to the X ray than those whose skins are not habitually shed? When a snake wriggles out of its corselet, or an armadillo throws off his coat of mail, do we not witness an apt illustration of the normal action of the rays?

Again, if we turn to the vegetable world, is it not a reasonable possibility that the subtle influence of the X rays are in request in the due development of all endogenous plants and trees? Of this class are the palms, the growth of the boles and stems of which proceed from the interior, and not by additions upon the outside, as in the other instances of tree life.

Yet, not unduly to prolong our quest, which, after all, is but of a tentative nature, for a moment let the matter of halation be considered. This should be a topic coming right home to every photographer. But every photographer is, in this regard, somewhat ostentatiously his own oracle. All that the writer can do is to raise the inquiry, whether it has ever occurred, to those who in the past have dealt with the matter of halation in these pages, that possibly the X rays, in their normal capacity, are frequent factors in the case? The hypothesis is one that lends itself to crucial examination, and it should not be difficult to determine whether these penetrative searchlight rays have not played a part in many a vexatious episode to which halation has given rise. Following upon an investigation of that nature would be a quest for some well-adapted material for the more effective isolation of sensitised films and surfaces, a material that should be practically impregnable to the unwelcome visitant.

AVEC M. JACQUES CRAPAUD.

By Wilford F. Field.

How Time heals all wounds! I had long ago a sneaking affection for the picturesque side of *La Belle France* and of M. Jaques Crapaud—a very charming fellow, despite the little affair at Waterloo. And so, with a few weeks at command, I recently hied away to enjoy a holiday, accompanied by my faithful Kodak, which is growing dilapidated with age, but is still a reliable *compagnon de voyage*, yielding pictures of which many a good story could be told.

Selecting the L. B. & S. C. Company's route, which is to be preferred for comfort, I journeyed from Newhaven to Dieppe. Coming into the port in daylight, one is struck with the picture unfolded. It is delightful—it is beautiful. And once at Dieppe, that merry little Kodak was constantly busy, for there is no end to the pretty things to be picked up. On the beach you will find marine studies galore; or, be you a student of the 'altogether,' you will find it here. The artist who loves his Latin Quartier (alas! how little is left) will be found busy here, for the *toillettes des bains* are ravishingly pretty, and Mrs. Grundy sleeps!

On the little river Arques there are some fine views to be had, and the

Casino forms a capital picture. The streets are mostly modern, but here and there, in quiet corners, are relics of the old Hugenots, and history is reminiscent at every step. And, being with Jacques Crapaud, one must go to the Camp of Cæsar, above Puys—reserve half a dozen films. Nor must we neglect the crumbling battlements of Gizors, and if Dieppe is crowded one can spend a pleasant time at Pourville at a ridiculous outlay. It is a roundabout railway journey from Dieppe to St. Valery, and the pedestrian will certainly get the best of it. Then we tramp on to Fecamp, where one can sip the original Benedictine and watch the bathers.

Etratat is only ten miles by coach, and it would be idle to predict how long one will stay. A splendid picture of the town can be had from a rowing boat, and life is altogether very enjoyable here. Not far away is Trouville, where the photographer will find his stock of films does not last for ever. Everything is gay, frivolous, and fanciful at Trouville. Ouida paints truly; see here for yourself, and yet we prefer it to the dull monotony of English resorts we could name. Any pictures to be had? Bless you, sir, they abound? We can get Corneville (the bells ring not as tunefully as in the opera), or we can sojourn at Hèbertot, or Cabourg, or Bagnoles-les-Eaux. Your camera will never be idle. I confess it—*La Belle France* is incomparable! *Bon voyage, m'sieu!*

QUALITY AND PERMANENCE IN GELATINE LANTERN SLIDES.

By John A. Hodges.

The gelatino-bromide process and its modifications may now be said to have established itself among those processes which are regarded as specially applicable to the production of lantern-slides; but, although the quality of many of the slides so produced is by no means all that could be desired, I do not agree with the ultra-conservative opinions held by some, that slides so made never exhibit the high technical qualities usually associated with older methods of working, for I believe that, upon the screen, a *properly made* gelatine lantern slide will not only hold its own in any company, but will be practically indistinguishable from others produced by those processes which are said to be peculiarly suitable for lantern-slide work.

Taking the collodio-bromide process as the standard of excellence (for albumen may be disregarded from the practical point of view on account of the tedious and difficult nature of the process), I have no hesitation in expressing the opinion that upon a *suitable* plate, and with *proper* treatment in exposure and development, slides of equal technical quality can be readily produced. In one direction, however, and this a very important one, namely, permanence, collodion undoubtedly has the advantage, for, unless toned with mercury, slides by the latter process seem to undergo no change; but, unfortunately, the same cannot be said of gelatine, for, even when the very greatest care has been exercised, the slides will sometimes change or deteriorate. To minimise the risk of fading due precautions should be taken, and my own experience has taught me that gelatine lantern slides should always be stored in a dry

place, for continual exposure to a damp atmosphere seems to have a very prejudicial effect, certain slides subjected to such conditions having obviously deteriorated, whilst in the case of others, made at the same time but stored in a warm, dry cupboard, no change is apparent.

When one remembers the hygroscopic nature of gelatine and the intense heat to which a slide is subjected in the lantern, it is obvious that the introduction of another and unnecessary condition may be attended with disastrous results. It would seem to be desirable to, as far as possible, counteract this hygroscopic tendency, and to this end a final soaking, before drying, in a dilute solution of formalin might be attended with a beneficial result. Moreover, the ordinary method of binding affords but little protection to a slide from the evil effects of a damp atmosphere, and it is well, in addition to varnishing the slide, to go to the extra trouble of first sizing, and then varnishing, the binding strips and edges of the slide; after binding, both size and varnish can readily be applied with a small camel's-hair brush; a slide so treated will be practically impervious to moisture.

But it is little use taking these precautions in the final treatment of the slide if it has not been properly fixed and washed. Many lantern-slide plates appear to fix very quickly, and consequently sufficient time in the fixing bath is often not allowed. Two fixing baths freshly prepared should be used, and five minutes allowed in each. Each slide should be washed under the tap for two or three minutes, and then for an hour in a dish or tank with running water. Slides so prepared will not be likely to prove impermanent through the imperfect elimination of hypo or the formation of indefinite or complex changes in the film itself.

Reverting to the conditions which are essential to quality, it is necessary that a suitable plate be chosen. To the unobservant eye there may not appear to be much difference between the numerous commercial brands of lantern plates now obtainable, but to the more discriminating the difference is very great. It is impossible, within the limits of an article in the ALMANAC, to go into minute details, therefore I can only indicate the conditions under which the most successful results will be obtained. A slow plate is an absolute necessity: any attempt to quicken a lantern emulsion must be attended with a loss of quality. The slower the emulsion, the finer the deposit and the less the tendency to granulation. A quick lantern plate is very undesirable; indeed, the finest slides producible on gelatine are only to be obtained on chloride plates, and these, when properly developed, cannot be excelled in technical qualities by any of the older methods of working, and almost equally good are the bromo-chloride plates made by several makers.

It will not be easy to produce a coarse-grained image upon a plate of the character I have indicated; but, nevertheless, if the highest technical standard of excellence is desired, attention must be paid to exposure and development. We may give the same gelatine lantern plate either two seconds or a quarter of an hour's exposure, and with different systems of development good slides may be obtained in both cases. But the character of the deposit forming the image will be very different; in the one case we shall have a warm-coloured image of great delicacy and with an entire absence of grain, and in the other a very slight degree of magnification will reveal the comparative coarseness of the deposit.

Short exposures and quick development with strong solutions are incompatible with the finest technical perfection in lantern-slide work on gelatine plates, which indeed will only be attained when the procedure indicated has been followed, namely, the use of a slow plate, to which a full exposure has been given, followed by development with a weak and fully restrained developer. Worked on such lines, the gelatine process may be confidently recommended to the attention of lantern-slide makers who are ambitious of obtaining the acme of technical perfection.

THE INFLUENCE OF BACKED PLATES UPON THE TIME OF EXPOSURE.

By Hector Maclean, F.G.S., F.R.P.S., &c.

Although most practitioners are by this time sufficiently familiar with the chief cause of halation, and with its chief cure, there are one or two secondary effects produced by using backed, in the place of unbacked, plates, which many photographers may easily have overlooked, but which they will do well to bear in mind. Of the aforesaid consequences, probably the most important is that which affects the duration of exposure. Many of us can remember how that, with the old wet plate, to which it was often impossible to afford a full measure of exposure, what was termed a supplementary exposure was given, *i.e.*, the plate was submitted for a brief period to the action of more or less subdued actinic light. The object of this was to slightly veil the half-lights and the half-shadows.

Opinions differed as to the wisdom or utility of this practice. Without entering into the merits of the question, it is enough that, much as this supplementary exposure modified the general scale of opacity with the wet-collodion plate, so, in the case of an unbacked dry plate, does—or should we say did?—halation affect the resulting image. Those actinic rays which, with a backed plate, become extinguished, are, with an unbacked one, in part reflected, and thereby exert an appreciable influence upon the resultant opacities of the negative. Although this influence is, without doubt, generally an unwholesome one, it at any rate reinforces the light action to an extent which is not always fully recognised. What the amount of this reinforcement may, under the most favourable circumstances, attain, may be gauged by the significant experimental researches lately made by Captain Colson, who demonstrated how the normal exposure of a dry plate may be substantially shortened by backing the sensitised film with a white substratum. Furthermore, support is given by citing the well-known fact that an emulsion spread upon paper is 'quicker' than the same upon ordinary glass, due to light which passes through the film being in one case reflected by the white paper, whilst, in the other, a considerable proportion passes through the glass, and becomes absorbed by the black backing of the dark slide.

Should any one have a doubt as to the importance of the supplementary exposure which an unbacked dry plate receives, let him back half of a plate, and thus expose it in a camera upon a landscape. On development, if the unbacked half presents an appearance consistent with correct exposure, the backed half will appear to be somewhat

under-exposed, the shadows and half-shadows refusing to fully respond to the reducing action of the developer, so that their detail and transparency are in a considerable degree ruined.

From the foregoing remarks it will be evident that a substantial increase in the normal amount of exposure needful for an unbacked plate is called for when a backed one is used. What is the precise amount of this increase remains to be fixed by comparison of the experiences of skilled photographers. From observations of my own work, and also that of others, during the past year, I should estimate the increase in exposure called for as not much less than fifty per cent. This, for the snap-shooter, is a serious prolongation of time, and will go far to make him chance halation in order that he may keep his fraction of a second as small as possible; but that such a policy is, nevertheless, an unwise one will, no doubt, be the unanimous opinion of the thoughtful specialist.

Some other consequences which follow the use of backed plates, and which the more ambitious 'pictorial photographer' would do well to bear in mind, must be held over for a future communication; if not to the delightful annual miscellany of up-to-date photographic information in which these lines appear, then to some less attractive publication.

SCIENCE AND ARTS.

By F. H. Burton.

Now that the smoke and din of the art *versus* science battle has somewhat subsided, it may be useful to take a brief survey of the field. We have had, on the one hand, writers so devoted to the scientific side of photography, that they have denied to the other branch any artistic possibilities whatever; while, on the other hand, we have had devotees of art comparing the intricate operations of exposure, development, &c., to the mechanical mixing of prepared colours on a painter's palette. That both contentions are equally wrong will, I think, be admitted by all who have kept outside the strife of the wordy contest; extreme views are rarely based on a solid foundation, and, as usual, the truth is probably midway between the disputants.

A photograph that violates the elementary rules of composition, however perfect technically, is a failure, and equally the finest composition may be ruined by faulty technique. For the production of the best class of work, the student must regard photography as both a science and an art intimately blended in one harmonious whole; it is not, and never will be exclusively either.

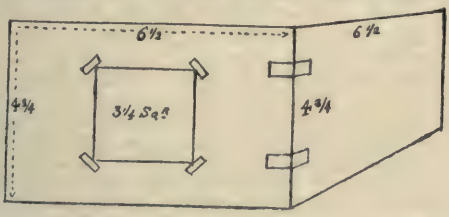
I would suggest to the elementary student that he first studies photography as a science, that he may learn the powers and the limitations of his materials, and when he has attained proficiency, to study lighting, composition, perspective; in a word art, with all the diligence and concentration he can command. Incompetent slovenly technique is not necessarily a proof of artistic capabilities, although we are sometimes asked to accept it as such; and equally the most perfect technique alone will not make pictures, or ever appeal to people of educated taste. The union of art and science is photographic strength. Don't divide them, let your work show a happy combination of both.

'DE MINIMIS.'

By F. J. Mortimer.

In response to the Editor's invitation to contribute to the pages of the evergrowing and evergreen Annual, I have succeeded in unearthing a much dog-eared note book, and, although perhaps the following extracts, taken at random from its pages, may not be startlingly original or new, they have at least the merit of being undoubtedly useful.

Good, serviceable, and cheap carriers for smaller plates in large, dark slides are to be made of stiff millboard. A piece of millboard $6\frac{1}{2} \times 4\frac{3}{4}$ inches, and about the average thickness of a plate, is taken, and an opening, $3\frac{1}{4}$ inches square (full), is clean cut in the centre with a sharp knife. A small strip of thin card is glued across each corner,



showing just sufficient, from the other side, to catch the corners of the plate; and a piece of card, also $6\frac{1}{2} \times 4\frac{3}{4}$ inches, is fastened to one end by linen hinges. The whole lot is then blackened by paint or ink, and the carrier is complete. When using, place the carrier face downwards, lift up the back card, place a plate in the opening, the little corners of card prevent it slipping through, shut up the back, and insert in dark slide as usual. Other sizes can, of course, be made the same way, and they cost less than a penny each—a cheap enough carrier surely.

Many photographers, especially amateurs like myself, keep and use old developers to obtain density occasionally. It will be found that a scum forms on old developer, and that wherever any particles of that scum attach themselves to the surface of the plate, they prevent action in those places, causing pinholes or big holes according to their size. The remedy is, of course, plain. Always filter old developers before using.

An excellent lantern-slide box can be made by obtaining a stout average-sized stay box from——Well, obtain a stout average-sized stay box, and line two of its opposite sides with that corrugated wrapping paper used when sending bottles through the post. This makes capital grooving, and a stay box is just about the right size to take a lantern plate, and will hold, dependent on the size of the grooving, about fifty slides. This grooving can also be used for larger plates in larger boxes, and costs next to nothing.

A very good matt varnish is to be made by adding a little tartaric acid to ordinary negative varnish, and an equally good retouching surface can be secured by beating up the white of an egg to a froth; let it settle, and add ten ounces of distilled water and four drops of ammonia, and flow over negative before drying.

The difficulty of telling which side is which when using bromide paper is easily overcome by just touching one corner of the paper with the tongue or lips, the film side is at once detected by its greasy touch. An even easier way is to just bite one corner, when the film side will stick to the teeth, or, by slightly damping the first finger and thumb and pinching one corner, the film side will adhere to the finger. The film side of lantern or dry plates can also be easily detected, even in the dark, by applying the tip of the tongue or lips to each side of one corner, the film side is unmistakable.

Pencil or crayon work can be fixed on bromide prints, and made to assume the texture of the gelatine surface by a jet of steam, such as can be obtained through a piece of rubber tubing fixed to the spout of a kettle being carefully directed against the surface. The upper surface of gelatine is softened a little under the action of the steam, and the powders are amalgamated with it. It is necessary, however, to watch the operation very carefully, and not allow the action of the steam to be too great, or the gelatine may melt and run.

Always, before going out with the camera, stick a little strip of stamp edging over the pull-out end of the dark slide. When pulling out the shutter, the paper is broken, and it is then easy to see which plate has been exposed, and the risk of double exposure is done away with. When on tour, plates that have been exposed and taken from the slides should not be packed with pieces of printed paper between them, or the ink will affect the plates, and the result on development will be a replica of printed matter, which does not tend to improve the negative. Either use clean pure paper for this purpose, or, better still, use nothing, and pack the plates, after carefully dusting them, face to face, then wrap them in the brown paper from which they were originally taken, and replace them in the original box. The box should be marked with the numbers, or each plate, when being packed, should have a piece of stamp paper stuck on the back bearing a number to correspond with the entries in the exposure book, which every well-regulated photographer, *of course*, always carries. If, however, plates have been damaged by the film having come in contact with printed paper, they should be washed for some time in a from two to four per cent. solution of glacial acetic acid, then well washed, immersed in alcohol, and developed in a vigorous developer.

When using hydroquinone developer with caustic soda as an accelerator, never forget to shake the bottle. Caustic soda is heavier than water, and in solution lies at the bottom of the bottle; so, with a full bottle, the ounce or so poured out is little more than pure water, and then the plate-maker gets blamed. In all toning baths containing sulphocyanides always add the gold to the bath, and not *vice versâ*, or else the gold will be precipitated.

The shifting of the paper during printing, especially when using small pieces, often causes trouble. This can be remedied by removing the wire which secures the spring on the back of the frame, and one of the holes, preferably that nearest the hinges, is bored through to the face of the frame, and a wire nail of sufficient length is then inserted from the front and bent over at right angles on the back until parallel with the surface of the wood. The pressure can be put on by forcing the springs down on the back and turning the nail until it lies across the

spring, the head on the other side, of course, preventing it being drawn through. Thus it will be seen that sliding the spring along the back which was the cause of the paper moving, is done away with.

Dirty bottles are often a bugbear in the dark room, especially when wanted in a hurry for fresh solutions and they refuse to get clean. The following may help: Greasy bottles should be washed with benzine or with a solution of permanganate of potash, to which has been added some hydrochloric acid. The disengaged chlorine in the latter destroys the fatty matter, which then disappears by washing in water. Bottles that have contained resinous substances should be washed with potash or soda, and rinsed with alcohol. Bottles that have contained essences wash with sulphuric acid and with water. In all cases, when cleaning dirty bottles, the addition of some fine shot, which should be vigorously shaken about in the bottle, considerably helps to remove the foreign matter.

Broken ebonite dishes, or cracked or chipped dishes, can be expeditiously mended and made sound by the judicious use of a little of Prout's elastic glue, which is cheap, waterproof, and easily applied, but is fearful stuff to get on one's fingers.

A good thing to remember, if it is required to weigh out chemicals and the weights are lost, is that three pennies weigh approximately an ounce avoirdupois, and so also do any number of silver coins making together in value five shillings, *i.e.*, two half-crowns, or four shillings and two sixpennies, and, of course, silver coins representing two-and-sixpence weigh half an ounce. A halfpenny and a threepenny piece weigh a quarter of an ounce avoirdupois.

And lastly, notwithstanding anything stated to the contrary, never use freshly mixed hypo. Nothing is so productive of frilling. Use it clean and fresh by all means, but not freshly mixed, as freshly mixed hypo is always considerably lower in temperature than the surrounding air or the developer, and, by taking a negative from a developer slightly warmed possibly by contact with the fingers, and, after washing, plunging it into a solution many degrees lower in temperature, frilling is almost bound to ensue, and the poor plate-maker has some more correspondence to answer.

BORROWED CHILDREN.

By James Reuel Smith.

Children lend themselves, as the French say, and that literally to the enlivening of outdoor pictures, to an extent that is not fully appreciated or availed of by the generality of photographers.

This may be accounted for partly by the usual shyness of the stranger child. Make any effort to induce one to appear in a picture, and it is likely that there will at once spring up such an antipathy to so doing that wild horses could hardly drag the small personage into the view. But diplomatically imbue the young one with the idea that his or her presence must not be manifest in the picture, and a spirit of opposition or of mischief will make it almost impossible to focus the scene without finding the supposed objectionable presence stealing across the edge of the ground glass, and then the matter is easily arranged.

In making a collection of pictures of springs, which involved a very pleasant journey of some 200 miles, and illustrated two score of sylvan nooks, it was a matter of surprise to find how ubiquitous the human youngster is, and nearly every photograph contains an unknown child of less than ten years, assuming in nearly every case a self-suggested pose about the spring, which adds more to the attractiveness of the print than would be imagined without comparison with the few sketches in which a little figure is wanting.

Girls, as a rule, are borrowed to better advantage than boys; they are more amenable to the subtle influence of candies, and they enter into the spirit of the composition more readily and soberly. They generally aim to make the affair a success, while with boys it is not unlikely to be discovered, when the lens is uncapped, that they have assumed some ludicrous attitude and spoiled the plate.

The rates for these loans are usually far from usurious, though at the end of an exposure I was once confronted with a doting father who boldly demanded something like 16*s.* for the use of his valuable offspring! Fortunately the argument attracted the mother, who was willing to compromise the matter for one of the photographs.

MUSIC IN THE SERVICE OF PHOTOGRAPHY.

By H. O. KLEIN.

THE space at my disposal hardly permits me to enter at greater length into the old acknowledged truth, that music has enormous influence on the human mind, and consequently changes the features of a person almost momentarily. What a world of different expressions are we able to call with familiar melodies, and how valuable the fact that emotions express themselves upon the mirror of our soul!

Now, while all this is universally acknowledged, it seemed to me so singular that so little use has been made of this invaluable phenomenon in photography?

The painter or sculptor has plenty of opportunity to study the individuality of his model, and to compose many a seen expression to a harmonious chord, giving life and soul, real artistic value to his work.

The photographer is far from having this advantage; he is bound to show in his portraits one expression, single and in most cases not individual. For a great many years experiments have been frequently made with the idea of finding the way to produce—force—that natural pleasant, and last, but not least, characteristic expression, a faithful representation of the character of a person, and surely not without result.

But there is still a vast number of persons to be found who did not obtain a satisfactory likeness, persons with highly developed sense for their characteristic beauties.

Their likeness was a truthful imitation of form, without that most necessary and essential item—life.

It is difficult to express in words what an artists feels, and which force enables him to enliven his portrait. I had opportunity to meet a lady, who told me that, in spite of her innumerable visits to the leading

photographers in this world, she could not obtain a good portrait, on account of her 'unnatural expression.' Unnatural expression, forced with the well-known entertainments in photographic studios, in connexion with the screwing of the 'head rest,' a ceremony which people dread like the torture of the middle ages.

The excuse for incompetency was the final decision, accompanied with a mysterious smile, that 'the lady had no features.'

And now I should like to draw attention to the following experiment: The same lady had been photographed by a clever man, who made use of a well-known melody during the exposure, and, to his great surprise, received a likeness full of life and character. The very soul of the model seemed to be expressed, and made the photograph a little work of art. This one case made the beginning of a great number of similar experiments, with the same satisfactory results.

I hope I have not touched a controversial matter in relating this extremely instructing and interesting event; and who knows, some day the photographer may be considered worthy to be called 'artist?' but I am convinced that that eventful day will not come until he learns to study his business with the same devotion and intelligence with which men of art study theirs, making use of everything requisite to give artistic value to his work.

PHOTOGRAPHING FEELINGS.

By J. Rees.

We are altogether too commonplace in our work, do not realise the possibilities open to us, and are too readily disposed to regard the advances made in mechanical, optical, and chemical directions as satisfactory, to the exclusion of much that is higher.

Nothing there is to be said against this bettering of the more material side of things—everything for it, indeed, as far as it goes, for there is no good sense, for instance, in carrying extra weight in a camera and its accessories if lighter ones will do as well; the better the lens, again, the better should be the picture; and extra rapidity in a plate may mean the essential factor that makes possible certain kinds of work. But there must be something above this, or we soon tire of it; the labour is too merely mechanical. One person can take a view as well as another if placed, with good gear, in the right spot, the general result being, that the great majority of photographs are much of a type, very few rising above a level of fair mediocrity. The pleasure of doing something distinctive, and, as such, flattering to pride or vanity, is thus knocked away as a stimulus, interest is lost, and a delightful occupation and pastime oftentimes given up, after the initial novelty has passed away, more from not knowing of its undeveloped possibilities than any hard-and-fast objection.

If this be true, the logical converse must also be, that, given distinctive interest in the work, pleasure would remain and increase.

The length and breadth of the purely practical and manipulative field being equally open to all, and requiring, mainly, but application and fair common capacity for its mastery, anything beyond technical finish and excellence must evidently be a something the worker can succeed in intro-

ducing as particularly belonging to himself, something of his own individuality in short. This is borne out, I think, if we look at the case of the artist. Who ever heard of a painter losing interest in his picture if his soul were in it? Ay, 'there's the distinctive rub,' *his soul* is in it; and, if the photographer is to taste of the same high pleasure, he must also have something of the same high aim, must introduce to as great a measure as possible his soul into his work, in the form of a clear expressing of a special idea or feeling. He is handicapped as compared with his fellow-worker in the having to pass his soul, or feeling, for more or less mechanical moulding, through a box, but that cannot be helped; and the moulding need not be the result of so hard a squeezing as to altogether spoil its shape.

How is it to be set about?

The first essential, of course, is the having a feeling to portray; equally so, that it be a one definite enough to stand handling, and pleasant enough to bring about the strong desire to picture it. Surely none of us can be lacking in such, nor in the accompanying regret, that if very pleasant they are so very fleeting. A man taking his early walks in the spring time, say, is very much, and very pleasurably, impressed by the sweet freshness of everything, the clear sunlight, bursting of buds, singing of birds, and all that goes to make up this most delightful of seasons. He feels nearer the hidden spirit of things than he generally does, and fervently wishes he could always remain so. He cannot, he knows; but, failing ever-present spring, why not deliberately analyse out the causes that go to make up his happiness, and by photographing a selected one, or two, or more, form a picture that would at any time, with the willing aid of the imagination, serve to bring up before him, and keep alive, the happy thoughts and feelings he so desires to preserve? A turn of the narrow lane, with an included foreground corner of budding hedge, a rough gate, flanked by a hawthorn beginning to bloom, lambs, and primrose banks; one or several of these, or others, carefully selected, composition as carefully arranged, best time and length of exposure arrived at after all-round looking at things, and due calculation —and all as subservient as they possibly can be made to the one central, dominant idea of representing spring. Or, possibly an older man, with the springtime of life behind him, he may find more congenial thought and deeper pleasure in the fruiting and the russet tints of autumn. Let him endeavour by including a characteristic touch in his picture to also photograph his particular feeling. The vague distances of the sea, sandy dunes, or breezy breadth of moorland, hold some chained and charmed; others respond most readily to the quaint disorder of a straggling fishing village, the mediæval air of the gabled houses in the cobbled streets of an old-world country town, the cloistered quiet of cathedral precincts, or the drowsy hum of an old mill wheel on a summer's afternoon; whilst yet others, enjoying and appreciating these very much, care best for expression of face or grace of form. There is no reason why charms and feelings begotten by all such should not to a great degree find expression in a picture.

"All very well in theory, reads pleasantly, but not practicable."

Oh, yes, it is; but not by the man who takes a dozen plates out at a time, and conscientiously exposes them; the rather by the one who is content to take out one plate, and bring it back again a dozen times unex-

posed, if the conditions be not favourable—or, better perhaps, one content to go on exposing, and smashing up failures, until he gets what he wants.

Imagine the satisfaction when such a negative is finally unfolding its so-sought-after beauties in the developing dish! How differently regarded to the work hitherto turned out, with its marring feature of indiscriminateness! or, as an enlargement, how differently regarded to the pictures at present upon our walls! A good deal of condensed wisdom and human nature there is in the old saying, 'Nothing pay, nothing value.' Hitherto it is too little that we have paid for our photographs; if we elect to pay more, we will value more the result, for it will soon be felt to be worth valuing.

Occasionally, such work has been turned out, but from its very nature, in requiring so much thought and trouble, it cannot be, nor ever become, common. The type of man, too, who goes in for it is not a common one—more perhaps than the one who can appreciate it—and consequently not a one to push himself and his work into the most public place. I am not referring to the conventional impressionist and his results; for, whilst giving him every credit for high aim, his methods must be wrong when they result in the muddy or misty out-of-focus productions generally shown us. There is no reason either why breadth of suggestion is only to be photographically given by grey subdued tones of subject in a low light. Very good work has been done in this way, but it is decidedly apt to make us feel a bit miserable; there is quite enough grey in actual life, without having its faithful presentation ever hanging before us; and, although, when a bit bilious, we are more in sympathy with the dull greys than the transparent whites and clear ambers, the bilious condition is, after all, the exceptional one; and with, in the main, a faithfully working liver, we would the better enjoy as a regular thing the more cheerful side of things. I fail to see that with a clear aim and careful selection—these as far and away the chief factors—watching for favourable lighting, and probably the use of a long-focus lens, a large aperture, and quick exposure, it would not be practicable to get the agreeable suggestion of warmth and sparkle of sunlight into a picture, to a high and satisfactory end.

It requires a great deal of thinking and arranging for proper accomplishment, and it is useless to think of consulting a text-book for instruction; but, from these very facts, I venture to think that it will appeal the more readily to the brainier photographer, gifted with a saving touch of sentiment and imagination, and who feels he has feelings worth the portrayal.

THE HAND CAMERA ONCE MORE.

By H. P. Robinson.

Last year I thought I had said all about the hand camera that I should ever have to say, but a state of finality is a state of bliss we shall never attain. This year I am in a position to paraphrase Sidney Smith's saying about being preached to death by wild curates; it has been my fortune to be almost photographed to death by wild amateurs. This horrible fate has given me an opportunity of examining several new

cameras, and, if we may argue from the particular to the general, I should conclude that the quality of the technical manufacture of cameras is falling off by leaps and bounds. It is, however, gratifying to know that nearly all the defective cameras I have examined are foreign made. I don't mean to enter fully into all the defects I have found, but will mention a very common one.

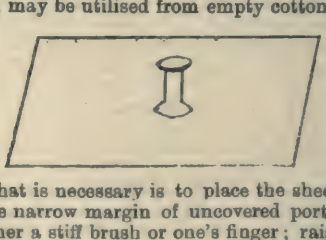
I have seen at least a dozen (imagine the torture of sitting for all these!) portraits of myself this year, taken by aid of different cameras, chiefly foreign, and the image of the unfortunate victim was not in the right position in the space. There was too much space in front of the figure, or behind, or on top, or below; or the head failed in its struggle to get all of it on the plate, like some of the very newest, most foreign-looking, and most approved portraits in the Salon this year. This gives me an idea that has not struck me before. The cause of this particular and much-admired eccentricity in foreign portraits is caused by this defect in foreign cameras.

To resume. I investigated this defect, so much appreciated by those who affect to worship the unusual, and found it to lie in the finders. In every instance these finders failed to register an image that could be relied on. It struck me that these were precisely the instruments to put into the hands of young amateurs who were ambitious of producing the best French portraiture in the most automatical manner; but, if they are wanted for serious use, one would almost think it would be worth the while of manufacturers to examine these instruments of precision before they are issued to confiding beginners.

MOUNTING P.O.P. AND OTHER PRINTS.

By W. E. Leek.

To mount prints cleanly, expeditiously, and without injuring the gloss of highly glazed papers, such as P.O.P., have one or more (according to the sizes required) sheets of tin or zinc, cut about three-sixteenths of an inch smaller all round than the print (trimmed to size) to be mounted. A convenient handle, fixed to the sheets of tin with a couple of fine screws or small wire nails, may be utilised from empty cotton reels.



To mount, all that is necessary is to place the sheet of tin on back of print, and paste the narrow margin of uncovered portion of print, using for the purpose either a stiff brush or one's finger; raise print with point of fine penknife, place in position on mount, and lightly press down with roller squeegee.

The advantages of this system of mounting are: the prints are less likely to fade, do not crackle, require less mountant, and economise time.

I append a rough sketch of the apparatus.

COMBINATIONS AMONG PHOTOGRAPHIC ASSISTANTS.

By Arthur Field.

I.—Trade Unionism.

Just in the same way as Mr. J. A. Randall, in The British Journal of Photography (April 17th, 1895), acknowledged my pioneer work in the cause of photographic organization, so I desire to repeat what I said in your last Almanac in acknowledgement of the work of Mr. Randall. It was by a mental evolution that Mr. Randall arrived at supporting my idea of a trade union for photographic workers; back in 1895 he had no desire to go to the 'extremity of forming a union.' The logic of events had caused him to embrace the full Union idea by 1896, and his suggestion that we should join the 'National Union of Shop Assistants, Warehousemen, and Clerks' was decidedly 'bettering the instruction.' I, with my idea of a photographic society, 'failed' (if there can be such a thing as absolute failure in such agitations); I equally failed when I tried to get a cognate craft to admit photographic assistants into its Society. Mr. J. A. Randall, in a happy moment, looked beyond the initial difficulties of our combination with the membership of a shop assistants' organization—very pluckily set aside the inevitable objections—with the result that photographic assistants, male and female, have now the opportunity of joining a compact and sound organization which has agreed to accept them as members.

Before I draw the attention of assistants to the advantages of the Union, I wish to say a few more nice things about myself. 'The Amalgamated Society of Lithographic Artists, Designers, Writers, Copperplate and Wood Engravers' was the society which I tried to switch my abortive photographic union on to. As I described in the last Almanac, this Society could not undertake, then, the apparently difficult task of discriminating between worthy and unqualified photographic applicants for membership. Yet, in this year of grace 1897, the 'London cousin' of the above organization (to wit, 'The National Society of Lithographic Artists') has 'Process Engravers' at the end of its title, and I learn with pleasure that process men, who were to be part of our photographic union are being admitted into the 'National Society' in large numbers. [I understand that the same development has been effected in the 'Amalgamated Society,' but I have never had the time to verify this.] I think I can pat myself on the back over this. A delegate from the London Society was present at the delegate meeting of the Amalgamated, where I advanced the plea for union, and the developments of to-day prove that we should never despair of seed sown springing up in good season.

Now to the 'National Union of Shop Assistants.' Its objects are (compare our old objects, 1890–91, pp. 758–60 of the 1896 Almanac), among others, to support legislation affecting hours of labour (weekly, half-holiday, and early closing); secure by union effort the reduction of excessive labour; abolition of unjust fines; securing of proper mealtimes, fair wages, proper sanitation, better apprenticeship system, &c.; in a word, 'to regulate the relations between employers and employed;' establish a register of situations vacant and wanted; give legal aid to members when necessity arises in their relations with their employers;

make a weekly allowance to affiliated and junior members if they are called upon to give up their employment through any trade dispute.

The Society also arranges for a *general* benefit section. In this section an unemployed benefit is paid to all full members who are out of employment through no fault of their own, or through obeying the lawful demands of the Union. Sick benefit is also paid in this section, and a funeral grant allowed to the nominees of members. Any member who joins as an assistant, and afterwards becomes an employer, retains his right to subscribe and receive such benefits as are provided by the Union, but has no voice in the management.

The following is the scale of payments *per four weeks*, and the benefits receivable per week :—

CONTRIBUTION AND BENEFIT TABLES.—MEN (Entrance 1s.).

Age on Entry.	Contribution per 4 weeks.	Benefit when Out of Employment or during Sickness.				Payment at Death to Members of		
		First 4 weeks, per week.	Following 4 weeks, per week.	Next 4 weeks, per week.	Following 12 weeks (per week) in sickness only.	2 years and less than 5 years.	5 years and less than 10 years.	10 years and upwards
	s. d.	£ s. 6.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
18 and under 30	2 0	0 15 0	0 10 0	0 7 6	0 5 0	4 0 0	6 0 0	10 0 0
	3 0	1 2 6	0 15 0	0 12 6	0 7 6			
30 and under 40	2 3	0 15 0	0 10 0	0 7 6	0 5 0			
	3 6	1 2 6	0 15 0	0 12 6	0 7 6			
40 and under 50	2 8	0 15 0	0 10 0	0 7 6	0 5 0			
	4 0	1 2 6	0 15 0	0 12 6	0 7 6			

WOMEN (Entrance 1s.).

18 and under 50	1 2	0 10 0	0 7 6	0 5 0	0 3 0	3 0 0	4 10 0	6 10 0
	2 0	0 15 0	0 12 6	0 8 0	0 4 6			

Half-benefit only will be allowed to members of six months' standing, and full benefit to members of twelve months' standing and upwards. The period of membership shall date from the first day of the month for which the first four weeks contribution has been paid. All contributions payable in advance.

The payment exacted from affiliated (or trade) members of either sex is 2*d*. per week; young people, under eighteen, 1*d*. per week. The entrance-fee in this section is 6*d*. and 3*d*. respectively.

That the arrangement for paying benefits are not empty promises can be proved from the following facts:—

1. The Union is always making more stringent regulations about members who have fallen into arrears, with a view to weeding out the useless.

2. It has sought to strengthen the society by increasing the contributions and reducing the benefits, rather than by playing down to the more acceptable, but less safe, alternative.

3. After all the processes of selection have been gone through, the Society numbers over 2000 financial members.

The moneys and the claims of all members are safe, no matter how far they may have to travel. They are either transferred to another branch or can pay to their original one, or in the event of either being impracticable their subscriptions are receivable by the central office. The moneys for benefit purposes are centralised and paid out from the centre. One-sixth of each full member's and one-half of each affiliated member's contributions are, however, retained by their own branch for branch expenses, as are also the entrance fees (1*s.* from full members, 6*d.* from trade members).

We have started a little branch in Maidstone, which is going along very nicely, although we find some difficulty in getting the ordinary shop assistant to even understand (let alone adopt) organization as a means of bettering his condition. If any photographic assistants, male or female, wish to join, and are not near any branch, I should be glad to give them advice and literature, and to enrol them as members of the Maidstone branch, if possible.

The time is not yet for this union to have been so affected by an incursion of photo workers as to become a 'Shop Assistants' and Photo Assistants' Union.' That is, however, only a question of time. If sufficient numbers join our own branch, say, in time for the annual delegate meeting we can put a resolution on the agenda to expand the name of the Society, and even to make provision for exclusively photographic branches if necessary. Already some of the most honoured names in the Union are those of photographers. The chief necessity is that photographic workers of all grades and both sexes shall form branches or join existing ones. In any work of the kind they will have the ready assistance of the General Secretary of the Union, or of myself. The addresses are: 'Mr. James Macpherson, N U.S.A., 65 & 66, Chancery Lane, London, W.C.,' and 'Arthur Field, Maidstone.'

Those who know the misery of unemployment without any reserve to fall back on, those who have to pocket insults and submit to injustice simply because isolated and dependent, have now the opportunity of securing a reasonable freedom from these evils. Will they avail themselves of it? It will be theirs in measure as they strengthen the substantial organization which is open to them.

II.—Co-operation.*

The specialist in this line, my sister, Eleanor Field, is unable to do much writing just now, so I, who am subject to the scribbling habit,

* Readers should first peruse pages 669, 671–74 of the 1894 Almanac; also 686–7 of the 1895 issue.

have to take the job on. I have suffered an equal loss with her in the death of our dear sister, Catherine L. Dymock, but to Miss Field the shock has been almost the cause of her own death. Mrs. Dymock was carried off by heat-apoplexy during the phenomenal summer heat of July, 1897, in the very prime of her physical and intellectual powers. In addition to the ties of blood thus rudely broken, she was a devoted supporter of the co-operative enterprise which Miss Field started and explained in the 1894 ALMANAC. Even back in the days when I failed to see the practicability of this co-operative movement, Mrs. Dymock was ever ready with sympathy and money for this and every other effort to benefit the working folk. Since I decided to try it for what it was worth I found her suggestions, her appreciation, and her support always sympathetic, always ardent. Still full of noble schemes to help others, she was suddenly struck down. The very week of her death she had had the joy of learning that a vilified and misunderstood pauper girl, whom she had placed into a situation with a sympathetic friend, had turned out all that could be desired. The sudden demise of such a one leaves an impression on the mind as of some mythological figure reaching up to a daring divine action and stricken into stone. Thus she stands in our memory, imperishable.

If I write more in this strain there will be too little about the Co-operative Society and too much about one individual. It can be excused, however, as the one great event for our struggling little enterprise during the past year. The withdrawal of such a liberal capitalist could not but have a retarding, almost crippling, effect on a mushroom business. Our other misfortune this year has been our inability to get satisfactory terms for renewing a three years' agreement on our Maidstone branch premises. For three years the Photographic Co-operative Society had been engaged in building up a sound portrait business at this branch, the heavy rent (inclusive, over 70*l.* per annum) being the only unpleasant feature. At the end of the three years our only terms of continued tenancy were to pay a bonus, raising the rent to the equivalent of 80*l.* per annum (inclusive), with no security for renewal at the termination of another three years. The Society decided to voluntarily cut the Gordian knot at this early stage, instead of perhaps compulsorily three years later. The result is that we are now looking for premises at a sane rental, exclusively for the portrait work. Our process department has fine premises at 3, Albion-place, Maidstone.

At Sheerness-on-Sea our branch continues in working order, for the conditions there are different. Housed in one of the largest business premises in the county—94, High-street—under the wing of a friendly distributive co-operative society, we are establishing ourselves in all branches of the trade. We have a finishing department at 18, Invecta-road. Requests to establish branches at Rochester and in London are now being considered by the Committee.

At Maidstone we are gaining an increasing connexion with photo-process work, collotype, and copying. It was a decidedly wise step taken when we entered on the block business, and, as to the copying of old photographs, one would never guess there were so many in existence till he had to receive and dispatch the work. In addition to this work, we have been appointed official photographers to the Co-operative Union. This is an organization embracing 900 societies, with a million of mem-

bers. Our photographs of their annual Congresses show from 800 to 1000 faces. A similar appointment has been conferred on us by the Co-operative Wholesale Society in respect of its Exhibitions of produce and merchandise held in the London and Kent districts. Descending to smaller matters, the Independent Labour Party, the Social Democratic Federation, and other advanced labour organizations have appointed us their official Conference photographers.

Still, hard experience has demonstrated the fact that it takes a lot of custom to build up a big business. Engraving included, our present output capacity is only 1000*l.* per annum. I may here say that if we had more trade we could not do it effectively without more capital. Many things that Miss Field estimated in 1893 and 1894 (see pp. 671–674 of the 1894 ALMANAC) have turned out differently in practice. Instead of 200*l.* capital, from 800*l.* to 1000*l.* can easily be utilised by an establishment employing eight to ten people. We now require more capital, as a much larger photo-mechanical business could be built up if we advertised, and had more and better plant. To attract capital and custom, we had to completely alter the division of profits, as given on the page 673 referred to above. The following is the present arrangement:—

After paying interest on share capital at the rate of not more than four per cent. per annum, and providing for reduction of fixed stock, buildings, preliminary expenses, and other first charges, the remaining profit are divided as follows:—

(*a*) Reserve Fund, until it reaches a sum equal to a quarter of the paid-up share capital of the Society, after which it may continue to accrue to the Reserve Fund, subject to the decisions of the general meetings of the Society, which may otherwise direct it to be divided between the Educational and Provident Funds, in such proportions as the meetings shall determine	10	per cent.
(*b*) Educational Fund	7	,, ,,
(*c*) Provident Fund	15	,, ,,
(*d*) Committee of Management	3	,, ,,
(*e*) Workers (pro rata on wages paid during the period to which the division relates)	35	,, ,,
(*f*) Customers (pro rata on trade during the period to which the division relates, and paid for within a time the Committee shall determine for all customers)	30	,, ,,

The profit accruing to every worker or customer is credited to his share account until he holds twenty 1*l.* shares in the Society; after that he receives it as he thinks fit. No customer shares in the distribution of profit under head (*f*) other than that due on purchases made, or work done, during the period to which the distribution of profit relates; nor if, during that period, the total purchases (or payments for work done) amount to less than one complete pound.

* * * *

The expense of entering accounts of, and corresponding with, holders of small parcels of capital, compels the committee to announce that only

those applications which ask for 10*l.* and upwards to be allotted, stand a chance of allotment.

This enterprise is, for all its struggles, a success. It has, in its own words, 'come to stay.' It has had to face more than competition (which it does not fear); it had to bear slander which would not consent to come out into the open, nor take on a tangible punishable form. Lying rumours went about, circulated in the first instance by people who thought the co-operative enterprise was to their detriment, to the effect that this was no co-operative society, but a business belonging to the writer of the present article, who was supposed to be under some embargo not to open a shop on his own account.

This farrago of folly and fiction was greedily carried along (for lies and typhoid germinate with equal rapidity in Maidstone) by political enemies of mine, not one of whom would have scrupled to do the underhand work he pretended to pillory. Among the more honest idiots, who believed the rumour, not one apparently tried to ascertain why a man should intrigue to create a business for thirty shareholders to own and get the benefits of! However, by the offer of a reward for information that should give us the author of the libel at first-hand, we got the infection under. The publication of the following official refutation, by the representative co-operative organizations of the country and district, gave the finishing stroke to the scandal:—

'Owing to false and misleading statements having been circulated in Maidstone as to the *bonâ fides* of the Photographic Co-operative Society, Limited., the undersigned certify that the above Society (of which Miss E. F. Field is Secretary), is a *bonâ fide* co-operative establishment. It is registered according to Act of Parliament, and a member of the Co-operative Union, also federated with the various national co-operative organizations. Consequently the business does not belong to an individual, but to the shareholders collectively." Signed, J. C. Gray, Secretary Co-operative Union, Limited; Mark H. Clear, Secretary Sheerness Co-operative Discount Association; William Broomhall, Secretary National Co-operative Festival Society; W. J. Lewington, President Photographic Co-operation, and Secretary of Barge-builders' Co-operative Society."

'Certificate of Registration.—"Register No. 3201 R. The Photographic Co-operative Society, Limited, is registered under the Industrial and Provident Societies Act, 1876, this 17th day of November, 1893. Copy kept, E. M. B. [Sealed] Registry of Friendly Societies Central Office."'

Here followed a list of thirty-three members, with their addresses.

* * * *

We are now desirous of spreading this movement for the co-operative self-employment of photographic assistants, not merely by improving our own co-operative shop with its two branches, but by giving advice, assistance, and literature to all who want to start a co-operative studio or workshop for themselves.

THE LEADING ANTISEPTIC IN PHOTOGRAPHIC OPERATIONS.

By Thomas Bolas, F.C.S., F.I.C.

Incipient putrefaction has perhaps more to do with the fading of silver prints than all other causes put together; of course, in saying this I am merely giving my own impression, which is a kind of roughly arrived-at resultant of numerous observations, and is not the outcome of the perhaps more trustworthy methods of statistical or other similar determination. Perhaps I ought not in strictness to use the term 'incipient' putrefaction, but rather the putrefaction of a small quantity of the whole mass present. This happens especially when silver prints, whether printed out or made by development, are enclosed in a mass of paper, and the whole is maintained for months or years in a slightly damp condition. It may be the prints are mounted on cardboard and piled together or they may be in an album, or may be bound as inset illustrations—a common enough practice nowadays. All papers of such kinds as are commonly used in printing, mount-making, and album construction, not only contain the less alterable vegetable fibre or cellulose, but also a certain amount of easily putrescent sizing material and sulphate of lime. When the book or other mass of paper is stored in a damp place, the sulphate of lime becomes reduced to sulphide of calcium as a secondary result of the putrefaction, and reaction between the sulphide of calcium and carbonic acid (another product of putrefaction) results in the liberation of traces of sulphuretted hydrogen, which itself is fatal to silver prints of all kinds if acting for long upon the damp prints. Any silver print bound up in an ordinary book (that is, a book printed on any paper but such chemically pure paper as only comes in on the fringe of the paper trade) and kept in a damp place for five or six years will, I believe, fade. This conclusion I have come to not only by noting the fading of prints placed in books already in that stage of putrefaction at which traces of sulphuretted hydrogen are evolved, but also by noting the difference of behaviour between copies of the same editions of books having silver-print illustrations, the illustrations being intact in the case of copies kept dry in the ordinary sense of the term, and faded in those which were in the sulphuretted-hydrogen stage of putrescence—a condition by no means unusual in libraries or dwelling-houses.

This brings me to my point, that for almost all, or perhaps all, photographic preparations liable to putrefactive change the best antiseptic of all is dryness. Dryness in the ordinary sense is good and desirable, but artificial dryness, such as one obtains in a well-managed chloride-of-calcium box, is better, and, when sensitive plates or paper have to be preserved for a long time under trying conditions of temperature, the chloride-of-calcium box should be used.

Just one general instance of the effect of dryness. Few objects disappear so rapidly as an animal and its skin in a hot and damp climate; but that same skin, dried and converted into parchment or vellum, is one of the most lasting materials if only kept dry, some samples of vellum about 2000 years old being as sound and good as when new. As a photographic equivalent, let me mention the case of a moist gelatino-bromide emulsion and a similar emulsion dried to a pellicle and kept in this condition, as Mr. Kennett proposed and practised.

SOME NOTES ON THE HALF-TONE PROCESS.

By William Gamble.

In my experience I find that every other process worker one meets has 'got a new process,' yet I think it may safely be said that in the past ten years there has not been one photo-mechanical process patented, published, or brought into use that is distinctly original. The germs of all present-day processes will be found in records dating back ten years or more, and, although vast strides have been made in photo-mechanical processes, it is really a fact that very little that is new has been invented. A great many valuable processes had lain dormant for a number of years because the time was not ripe, but nowadays, when every one interested can see the value of these old ideas, they are being constantly unearthed from back numbers of photographic journals and year-books. In the hands of practical men some of these old processes have been made very useful by adaptation to present needs. But to the beginner in process work they too often prove great pitfalls, leading to waste of time and money. For instance, think of the number of people who have run away with the idea that an irregular grain would be much better than a mechanical grain for half-tone blocks, when they ought to have seen that the very success of the ruled screen proves that it has accomplished what scores of the most able experimenters tried to attain before the present method came into vogue. The half-tone process of to-day is an exemplification of the law of the survival of the fittest. It is at its best a compromise, but we can say it is the best possible compromise in the matter of converting a photograph into a typographic block. I am not one to advocate that we should rest content with our present methods, but I do most earnestly counsel young process workers to avoid wasting their time on obsolete processes before they have fully learnt those which are practised to-day.

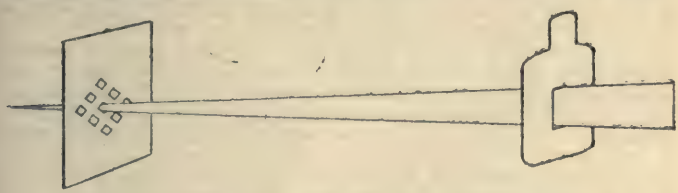
Then again, I would like to give a word of advice as to trying to dispense with appliances which are universally conceded to be the right things for the work in hand. It is not difficult nowadays to find out what is generally used in the trade in the matter of screens, cameras, lenses, and other appliances; and it would save the beginner much in temper and in pocket if he would be content to follow the lead instead of going his own obstinate way, or allow himself to be persuaded out of the beaten track. There is no article so indispensable for the working of the half-tone process as a good screen. Several have been put on the market from time to time which have only proved traps for the unwary novice to part with his money. There is only one screen that is accepted as orthodox, that of Max Levy, and let the half-tone worker who would be successful be sure he gets it.

Further, I would counsel process workers in buying screens to avoid any faddist notions about the ruling. The usual thing is to have a black line the same width, or a trifle narrower than the transparent space between. Either excessively thin or thick lines are a mistake. Better leave it to the maker to supply what has been found most useful and learn to use that which he supplies. The character of the line may necessitate some slight difference of working, if the operator has been accustomed to either a thicker or a thinner line. This variation of method will consist in one of two things, either a difference in the

normal distance of the screen or an alteration of the stop. Some operators think that a thick-line screen merely necessitates a longer exposure, but it will be found, so far as concerns the half-tone process, that a longer or shorter exposure does not amount to the same thing as varying the size of the stop.

This brings me to the much-debated question of screen distances, and it may be safely said that in the year just ending all the leading operators have been brought into agreement on this point, and it is now admitted that a variation of the screen distance is a necessity for securing the best results, but I am afraid that a good many do not yet grasp the principle on which this matter of distancing the screen is based. The general principle, cleared away from theories of such action as diffraction and penumbra, which only concern the advanced worker, can be readily proved by some very simple mathematics, but, unfortunately, so few care to try grasping it in this way. Perhaps I can make it more plain by the following method of ocular demonstration.

Cut out of stiff cardboard a triangular strip having a base width of about 1in., and long enough to form a fine tapering point. Also cut out the pattern of a few screen openings. Insert the cardboard wedge through the aperture of one of the diaphragms usually employed until the wedge fits the opening. Also insert the point of the wedge through one of the pattern screen openings, as far as it will go. The result will be as this illustration:—



Now if we suppose that the wedge of cardboard is a pencil of light coming through the diaphragm and passing through the screen opening, we conceive a very good idea of the action of the screen. The tapering end which projects behind the screen is the proportionate screen distance for the size of diaphragm employed, and if we place a surface (to represent the sensitive plate) in contact with the point of the wedge, we are placing the plate at the best possible distance from the screen. Obviously, if we make the screen opening larger, this distance will be longer, because the wedge will go further through. This very well illustrates the proportion which exists between the size of the diaphragm, the size of the screen opening, the extension of the camera, and the screen distance. It shows that, if we enlarge or decrease the extension of the camera, we must enlarge or decrease the stop correspondingly, for the wedge must always be a fit in the screen and diaphragm openings. It will be found in practice that we cannot so exactly adjust the conditions that the screen distance may remain constant, and, at any rate, it can only be constant for one particular screen; therefore, I counsel the necessity of a screen adjustment gear either in the back of the camera or in the dark slide.

BACKGROUNDS.

By Edmond Wallis.

It often happens that a photographer, especially in a provincial town, has occasion to require the use of special backgrounds to suit subjects, that are a trifle out of the beaten track as regards the general run of studio work, such, for instance, as theatrical pictures, fancy-dress portraits, and also pictures that he may wish to arrange himself as show specimens. In such a case the purchasing of a background is quite out of the question, as it would have to be painted on purpose, and by the time it could be received it would be too late. On the other hand, it could be painted by the photographer himself with a few points to work with (as I take it, most have a knowledge of drawing sufficient for the purpose) in the evening. When, as is mostly the case, an appointment is made a day beforehand, it would be ready for the studio next morning.

As the details of stretching the canvas, mixing the distempers, &c., do not exactly come in the glimmering of nature, a few sentences on the same may come acceptable to a few.

A canvas known as grey calico can be procured at any drapers of a width suitable for most subjects. Ninety inches is the widest most drapers stock, but it can be obtained to order up to 9 feet. It will be found that a width of 90 inches will, however, allow enough space for most subjects, and that could be sewn together for large groups without the join showing if the seam side is not painted on.

A framework the size of the ground decided on must be made of $2\frac{1}{2} \times 1$ inch, halved together at the corners, and firmly screwed with cross pieces at the angles to keep it square, which done the canvas may be stretched, beginning at the top left-hand corner, using five-eighth clout nails, and driving them in half way about 8 inches apart. Start, if possible, with the outside or selvage edge of the material, and keep it in a perfectly straight line, not pulling the canvas too much, as it will be found to stretch very easily at the edge, and cause wrinkles lower down that will be difficult to get rid of. Having finished the top, come down the left-hand side to within a foot or so of the bottom, keeping the edge square with the frame; then the right-hand side, and, lastly, the bottom, taking it out to each side from the middle, and observing when the first nail is put in that it centres the stretching. Work out to the corners; leaving the space not tacked on each side until last allows any creases to be better got rid of than would otherwise be the case. Observance of this avoids being compelled to pull out nails again.

Being stretched satisfactorily, it should receive a coat of size, made by placing size procured at the oil shops in sufficient water to cover it, and warming until dissolved, which should be evenly applied with a suitable brush. The best to use is that known as a pound brush, but as these are rather expensive, a cheaper tool is one of an oval shape, about 2 inches or $2\frac{1}{2}$ wide. It should be allowed to dry before painting.

Now, as to mixing the distempers. Those most used and generally liked for softness of effect are mixtures of whiting and lamp-black, held on with size, although, if a warmer tone is desired, burnt umber may be used. Procure seven pounds of whiting, place in a pail, and just cover with water, allow to stand a time, when pour off the water not taken up. Next melt six pounds of size in enough water to nearly cover it, and

when dissolved, add to the whiting (reserving about a pint to mix up the lamp-black), and well stir until all the whiting is thoroughly mixed with it. For the black, three quarters of a pound of lamp-black are put into a vessel, and the size well mixed in a little at a time. If it is all added at once, owing to the lightness of the black, great difficulty will be experienced in mixing, which, if not thoroughly done, will allow particles of lamp-black to work out by the action of the brush in applying, and result in the shade drying much darker than it looked otherwise.

It is best to have about four shades. Leave a little white and black, and have the lightest shade to dry about the tone of a light India-tint mount, the darkest nearly black, and the two other shades equally intermediate. The shade should be ascertained before painting by applying a little to a piece of cardboard, and drying at the fire, as it dries a good bit lighter.

Three or four brushes will be needed of the size described, and one known as a flitch for lining. For the latter a straight edge will also be required 4 feet long, 2½ wide, 1 inch thick, and bevelled at the edges, so that the distemper as it touches it does not touch the canvas, on the principle of a ruler for pen and ink.

The painting is better described as dabbling with the brush rather than working on the up and down and across lines of the house-painter; one shade being dabbled and worked into the other before it is dry. A very free hand is necessary, especially with foliage. Effect is obtained suddenly rather than by drawing with a brush. Not too much detail should be aimed at, or breadth—the essential feature of a good background—will be out of it. All design is better suggestive than forcible; a soft effect rather than a crude mapping of lines. The principles of drawing must be correct as to perspective, and the rest will come after a short acquaintance with the brushes and the ease of handling distemper that only comes with practice.

PHOTOGRAPHY FOR THE *DILETTANTI*.

By W. Hampson.

After a season with a 12 × 10 outfit, weighing thirty-six pounds, when ready to take the field, Nature at last rebelled, and compelled me to look round and see if photography could not be conducted under pleasanter auspices.

Certainly there is a distinct charm and delight in seeing the image on the screen of a large camera altogether forbidden to the user of a small size, but this pleasure is apt to pall upon one after a time, when it entails the user converting himself into a packhorse every time the camera has to be moved.

I decided on a change. The camera must be quarter-plate in size, it must go into the pocket; this necessitated using dark slides, the slides must go into the pocket likewise. The camera must be capable of being used on a tripod if wanted, have rising front, focussing arrangement, and shutter giving different speeds. These were stringent conditions, but, after much searching in catalogues, I found them exemplified in Shew's Xit camera, which is remarkably compact and efficient.

I can now sally forth, with camera in one pocket and slides in another, for my morning, afternoon, or evening walk, feeling sure I shall be ready to attempt to photograph that pretty bit or splendid sky effect that always presents itself when the camera is left at home, and even if nothing worth exposing on is seen, the camera is no inconvenience, as it unobtrusively rests in the pocket; in fact, one almost forgets it is there until wanted.

Another advantage, I can go equipped in the company of non-photographers for a day's outing, and not be looked upon as a curious kind of animal, like the common or garden photographer, who generally takes up the cosiest corner of the vehicle with a mysterious looking bag, and tips the hat of the testy old bachelor over his eyes with the end of his tripod, or else places a black box with an evil eye glaring in the face of the old maid, who insists on changing seats, as she does not want to be photographed—oh dear no! not for the world!

Such a camera as this, handy and efficient, adds a new lease to a photographic life, and I should advise any one who is tired of carrying the stand camera, or the equally disagreeable black box magazine camera, to give the pocket one a trial. But it must be quarter-plate in size; a less than this is not so convenient, mainly from the difficulty of procuring plates in out-of-the-way districts, whereas quarter-plates are met with everywhere.

PRINTING IN CARBON.

By W. M. S.

I THINK it must be admitted that printing in carbon gives the most artistic effects of any known process, and brings the work of the photographer nearer to that of the painter's brush than any process yet discovered. Bichromate of potash is the sensitive salt used, and gelatine the medium by which it is held on the paper. Almost any colour may be obtained by adding a suitable pigment to the gelatine.

The *rationale* of the process is briefly as follows:—Bichromate of potash has the property of causing gelatine to become insoluble in hot water after exposure to light. Paper is coated with gelatine, to which some pigment has been added, and is called commercially unsensitised tissue. To sensitise, the paper is treated with bichromate of potash, and, when dry, is fit for use. The sensitised paper, or tissue, readily absorbs moisture, and must therefore be kept perfectly dry, otherwise bad prints will be the result. It also undergoes gradual change, so that the sooner it is used after sensitising the better. It will, however, keep in fairly good condition for twelve or fourteen days, but, when possible, it is desirable to use it fresh. To make a carbon print, place a piece of sensitised tissue behind a negative in the usual manner, and expose. The action of light produces no visible effect, so that some means have to be adopted in order to know when it has received sufficient exposure. I find that the simplest method is to select another negative of as near as possible the same printing density as the one off which the carbon print is to be made, and expose under this a piece of ordinary printing-out silver paper side by side with the carbon print until it is very slightly darker than the finished print should be. When that point is

reached, it may be considered that the carbon print has also received sufficient exposure. We have now to develop the print, which is done by dissolving away the unchanged gelatine and pigment with hot water. First of all the tissue has to be transferred from the temporary support, as the paper on which the gelatine and pigment is termed, to a final support, or, in other words, it has to be stripped off the paper on which it was exposed and transferred on to another piece. To accomplish this, the print is soaked for a few minutes in a dish of cold water to slightly soften the gelatine. A stout piece of transfer paper is then placed over the print while it is in a wet state, and both are laid on a piece of glass and sponged or squeegeed carefully to insure intimate contact. Dry off the superfluous moisture with blotting-paper, and it is then ready for development. Have a dish containg water, at a temperature of from 100° to 110° Fahr., in readiness, into which immerse the print with its support. In a few minutes the gelatine will be seen oozing out between the paper. When this point is reached, take hold of one corner of the paper and strip it evenly off. This, of course, requires a little care and practice; but do not be discouraged if you fail on first trial. You have now in the dish of hot water the gelatine transferred to its permanent support. Lave the hot water over it until the gelatine which has been unacted upon by light is all dissolved away. When this is done, well wash the print until the water runs off it quite clear, and place it for a few minutes in a saturated solution of alum. Well rinse again, and the print is finished.

It may be here mentioned that the picture will be reversed, *i.e.*, objects to the left on the negative will be to the right on the carbon print. Should it be considered desirable to produce a picture without this reversal, the tissue has to be tranferred a second time, and is known as the double-transfer process. It is, of course, more troublesome, and, for all ordinary subjects, unnecessary.

There are many points of detail in the process which cannot be dealt with in this short article. Any one, however, wishing to take up carbon printing will have no difficulty in obtaining full information from the makers of the tissue. I would strongly recommend amateurs to turn their attention to this kind of printing, and I can promise them they will be charmed by it.

DARK ROOM LIGHT.

By T. E. Huston (Cannelton, Ind., U.S.A.).

Many amateurs fail to make good negatives because they trust to the cheap lanterns sent out with beginners' outfits. Some of these are nothing but a cylinder of ruby paper or fabric, of more or less uncertain age. All coloured cloth or paper fades more or less, and much of the ruby cloth has small holes in it. Again, this class of lantern obscures the light so much that it is necessary to hold the negative quite closely to be able to see what you are doing. No light is safe if you use too much of it.

Get a wooden box of any kind, about eight inches square and twelve inches high, a piece of ruby glass six by eight inches, and one of green

the same size, a hand lamp, a piece of tin, and some lampblack. Cut out one of the sides of the box, and put in the glass, green on the outside. Make a sliding door on the opposite side large enough to admit the lamp. Cut a hole in the top for ventilation. Swing a piece of tin just below to shut in the direct rays. Paint the inside a dead black, and there you are. You will have plenty of light, and one that is both safe and pleasant. The green light screens the eye from the unpleasant effects of the ruby light. With this light any room will answer for a dark room at night. Have a screen to shut off the light as much as possible during the first stages of development. Accustom yourself to fill plate-holders in the dark, and you will have less trouble with smoky negatives.

A considerable experience this summer convinces me that amateurs are not the only people that sin 'against light' in this manner. I have seen professional darkrooms that were far from dark. Streaks of daylight peeped cheerfully under the door, and the great sun himself looked in through one thickness of ruby glass. How good work is done under such circumstances is beyond me.

HOW TO REMOVE SENSITIVE PAPER FROM A NEGATIVE TO WHICH IT HAS STUCK FAST.

By J. T. Hackett.

About three or four years ago I took two 8½ by 6½-inch gelatine negatives of a house from two different points of view, which I varnished with a spirit varnish in the usual manner; but, as the negatives were rather dense for a bad, diffused light, I printed them in the sun. But judge my surprise when I found that the sensitive paper was stuck fast to the negatives in two or three different places in patches of at least half an inch wide and about two inches long. I need hardly say that the cause of this occurrence was due to the action of a hot sun on a tacky varnish, and perhaps also slightly due to a little dampness of the sensitive paper and the pads of the printing frame. Had I known that the varnish was tacky, I should not have used it, of course, but I did not know it until it was too late. The prints had therefore to be torn off the negatives in several pieces, and, as the portions that would not come off covered important parts of the negative, I unfortunately lost a very good order, as the bad weather and other causes prevented the negatives being retaken. As I did not know at that time, a certain method of removing the pieces of sensitive paper without running a great risk of destroying a portion of the image that was under it, although I tried to do so; I therefore put the negatives away, thinking that I might think of a plan of doing it at some future time, and that they would do to try it upon. The following method I discovered by accident some months ago, and found it answer very well indeed if proper care and patience are brought to bear when employing it. *On no account must the negative be placed in water, because, although this method might easily remove the sensitive paper, it would dissolve the free silver in the paper, which the gelatine film would absorb very readily*, which, although it may not show its presence at the time, it would probably do so sooner or later under the action of

light, after being printed from for some time, showing the well-known reddish or reddish-brown stains so difficult to remove, and sometimes it is quite impossible to do so, for generally what will dissolve or remove them will also remove the image itself as well or a part thereof. Perhaps the best thing to remove these stains is the following solution :—

Cyanide of potassium	5 grains.
Strongest liquid ammonia	10 drops.
Water	20 ounces.

This is applied carefully to the dry film with a tuft of cotton-wool or a piece of washleather to the stain until it is removed; the negative is then well washed and soaked in water for an hour or so, after which it may be wise to refix it in clean hypo solution, four ounces to the pint, as usual. The object of this refixing of the negative is to prevent the appearance of silver stains, which might otherwise put in an appearance later on through the gelatine film having absorbed some of the silver from the sensitive paper during printing. Never take even a proof from an unvarnished gelatine negative for obvious reasons. It is best not to wet the whole of the film with water previous to applying the cyanide of potassium solution, as then the film will not absorb so much of the solution around the spot near the stain as it might otherwise do, and perhaps dissolve some of the finest details of the image. If the above solution does not act quickly enough to please the operator he can make it stronger, but I prefer to apply a weak solution several times to using a stronger one, as its action is more under control and is stopped more quickly.

Now for the removal of the paper from the negative. Water must not be used for reasons already stated, neither must strong spirit be used either, because it dissolves the spirit varnish around the paper, and does not assist so much in the removal of the varnish as turpentine does, which I find far superior to spirit, because it does not dissolve the spirit varnish with which the negative is covered. It is a good plan to place the negative on a good retouching desk while the paper is being removed from it, as it is easier to see what one is doing then, and how the work is proceeding. In this way it will be found much easier to avoid cutting or scratching the film in any way, a very important thing to prevent. A piece of cotton-wool or washleather is dipped into the turpentine (that sold at oil-shops is suitable), and rubbed over the paper carefully, but briskly. The turpentine and the friction combined will remove the thinner portions of the paper usually, but a very sharp, thin-bladed penknife (or retouching knife would do) will be necessary to remove the thicker portions of the paper. It is used in such a way that thin slices are cut off the paper at a time; but, towards the close of the operation, which is a very delicate one, the thin portion of the paper still remaining may be scraped off carefully with the knife. An indiarubber ink eraser will also assist the operation from time to time. The paper must be re-wetted with turpentine every now and then during the process. If the paper is stuck to the unvarnished film, it is best removed as directed above, after which all the turpentine is rubbed off with a clean rag, and the cyanide solution applied to remove any red or brown silver stain there may be in or on the film itself. If there is none visible, apply for a

short time all the same, after which wash the negative well, soak, and refix in hypo, well wash, and, when thoroughly dry, varnish it with a reliable varnish. I prefer normal or enamelling collodion to any other varnish for gelatine negatives, although Hartley's Standard Celluloid varnish is, perhaps, superior to it. I have used both with good results. A very good substitute for any varnish is some good retouching medium, applied all over the film in the same manner as if it was going to be retouched all over. This forms a very good temporary protection to the film, while a proof, or even an order of six to twelve copies, are being printed from it; and, if, after a proof has been taken, it is thought that the negative can be improved by being reduced in density or by intensifying, the retouching medium is quickly and thoroughly removed by means of a rag dipped in turpentine being rubbed all over it, when the negative will be found as clean and smooth as it was previously. The great advantage of this treatment is cheapness, as a 1*s.* bottle will temporarily protect several dozen half-plate negatives, and the sensitive paper does not stick to it in the hottest sun unless it has been applied too thickly, or not allowed to dry properly in the sun or near a fire previous to printing from it. Staining the film is almost, if not quite, prevented by this treatment. If the negative is found all right as regards printing density, it can be retouched, if necessary, and then varnished with either of the varnishes mentioned above, which I believe to be the best it is possible to use for the purpose. Spirit varnish is removed with strong methylated alcohol.

A FEW TROUBLES AND THEIR REMEDIES.

By ARTHUR H. POOK.

A VERY convenient method of backing plates, and one that takes but a few minutes to perform, is as follows: Place two plates face to face and put them in a printing frame, fasten in the back, as usual, and then paint the exposed glass side of the plate with a caramel backing—the pure caramel recommended by Professor Haddon in last year's volume of the ALMANAC is undoubtedly the best—put on a piece of thin, unglazed, yellowish-brown paper, the kind one gets with one's shirts and collars from the laundress is very suitable, cut about one-eighth of an inch smaller all round than the size of the plate, remove the back of the printing frame, reverse the plates, replace the back as before, and paint the glass side of plate No. 2; another piece of the thin, yellow paper completes the work, and then one has two nicely backed plates, with a clean edge one-eighth of an inch wide all round. Personally, I have found this an exceedingly clean and expeditious method of accomplishing an important, but what is often, with good reason, considered a dirty and messy, operation. This method is a sure preventive for stray splashes, smudges, and drops, which so often find their way on to the film when applying the paint.

Uranium Intensification.—How many have not been troubled with unequal intensification when using this intensifier? This fault troubled me for a long time until, after some experiments, I traced the cause to small patches and films of grease from handling the negative. To remove this greasiness, I soaked the negative in a two or three per



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cent. solution of caustic soda, rubbing the surface of the film with a tuft of cotton-wool till its surface assimilated the water perfectly, then wash very thoroughly and intensify without first drying the plate. It is necessary that the washing be well performed, otherwise the cure will be worse than the disease, very minute quantities of caustic soda being a solvent for the uranium salts. I have found uranium a most useful intensifier for over-exposed and fogged plates, my method being, first, to reduce them with the ferricyanide bath to mere ghosts, and then washing well and intensifying.

Print Washing.—To refer once again to this time-honoured heme, it is, I think, at once obvious to any one giving the matter a moment's thought that, when occasionally changing the water in which prints are washing, one is only lessening in a certain percentage the amount of hypo originally taken up by the prints when in the fixing bath. Now, my object has always been to reduce the time spent on print washing to a minimum, but, at the same time, to ensure thorough washing and permanence of the prints. I, first of all, allowed the prints to drain for a time between each washing water; this reduced the water saturating the prints to a great extent, but, after a time, I found that by squeegeeing the prints face downwards to a piece of plate glass and then stripping off and putting into the fresh water was the quickest and surest way of eliminating hypo. After the fourth or fifth change of water, each of, say, ten or fifteen minutes' duration, the amount of hypo left in the prints will be a very infinitesimal quantity. Of course, this method is only applicable when washing a small number of prints at a time; but to those amateurs who prefer quality to quantity, I can thoroughly recommend it.

A very nice finish may be given to gelatine prints by squeegeeing them to a piece of Sawyer's temporary support, used in carbon printing, properly waxed and soaked in water. The two should be separated when 'bone' dry, and the result is pleasing to those who do not like too high a glaze.

Perry's spring paper clips are useful to clip on the edge of thickly coated and other plates that are inclined to frill badly in the washing waters; they have saved many a plate for me by being applied in time and preventing the frilling extending all over the plate.

DEVELOPERS FOR RAPID PLATES.

By Alfred Watkins.

'Use the developer recommended by the makers.' How often is this advice given in the reply column of a photographic journal? I am not sure that it is always right, and, from my own experience, I should say that some makers cut down the amount of bromide in their formulæ to a dangerously small amount, or even omit it altogether, and that it is almost impossible to get unfogged negatives with the developer as given when using the most rapid brands.

If you are getting thin or foggy negatives with rapid plates, it is well to considerably increase the amount of bromide, and not to curtail the time in the developing dish. I have used plates with which I found it

advisable to use an amount of bromide equal to the amount of pyro, but this was exceptional.

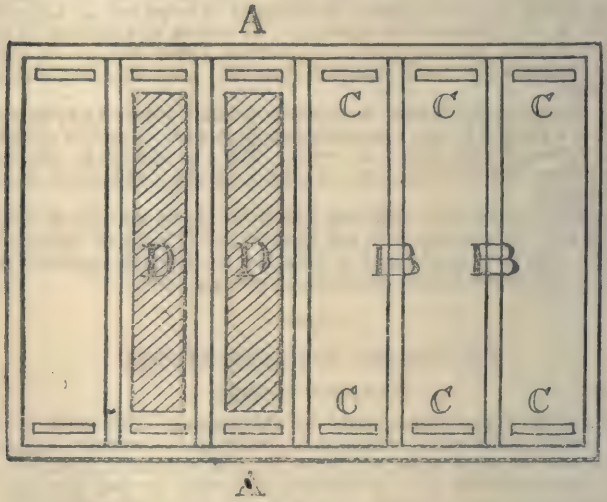
There is, perhaps, a reason for some makers curtailing the bromide, as by so doing they increase the apparent speed of their plates.

In a most interesting and valuable series of experiments recently published by Messrs. Cadett & Neall in *Dry Plates*, they found that they could get great increases in speed (Hurter & Driffield readings) with pyro-ammonia development by modifications in development, but that such increases were accompanied by corresponding increases in the amount of fog.

PACKING PLATES.

By Albert Levy.

It may seem as a step backward to speak now of packing dry plates, when so many seem to give these up and use films. Yet some of your readers may use dry plates of a size larger than half-plate, and like to prevent breakage as well before as after exposure. The usual packing of a dozen packages separated by straw I found very unreliable, as by stuffing it a little too hard one or two plates may be broken, and the ones



opposite scratched. Besides this, when only one dozen is needed, and must be replaced by another dozen package of exposed plates, it is very awkward.

I have, to prevent breakage and other trouble, used for many years, with uniform satisfaction, a box, of which I send you herewith a small

design. The size of this box is made to suit the size of plates. The view I show is from top; the lid should be screwed. A, shows the outside box; B, boards (thin), same width as the box of plates, but somewhat longer, and sliding easily in box; C, boards (thin), somewhat wider than thickness of box of plates, but as long as the box is deep; D are the dry-plate boxes. These fit nicely in the grooves thus reserved for them, and no breakage need be feared, as one dozen of plates does not touch the other, and is preserved all round.

I suppose that for convenience and easy handling a good many amateurs or others use ferro-prussiate paper to get proofs of negatives, and, for that matter, also professionals, for the reproduction of large designs or drawings for architects, &c. To those I would say that, when using good ferro-prussiate paper, by washing the prints twenty-four hours or so after exposure gives a nicer violet tone than the ordinary blue. When the paper is a little old, which means all the way from one month to two years, a longer washing is necessary, or until the whites appear clear, or very nearly so, as in the latter case they whiten somewhat while drying. In winter especially, washing with warm water hastens the results and often improves the print.

When printing from a negative (gelatine) which is not perfectly dry, or when, by some other reason, a drop of water sticks the paper to the negative, tear at once the paper off as much as possible, and immerse the whole plate in water, and soak well until the paper can be rubbed off gently; wash well under tap, and set up to dry, and generally no mark will remain.

CLEARING BROMIDE PRINTS.

By Harold Baker.

When using the new developers—hydrokinone, metol, &c.—for bromide prints, less care is necessary with regard to cleanliness than with the use of ferrous oxalate, and, as the prints continue to develop when removed to clean water, they are often passed straight from the developing to the fixing dish, and the hands become contaminated with hypo, which is liable to stain the next print. Paper that has been kept a long time will also show brown stains, with an irridescent appearance round the edges, especially in vignetted prints. When large numbers of prints are being produced, the loss from these stains is sometimes serious.

Some years ago I saw a method recommended by an American photographer for removing such stains, and I tried it with great success. I do not think I have seen it recommended by any English worker, but I have often found it very useful. Ferricyanide of potassium is generally recommended, but, in my hands, it always attacks the image, however dilute I have used it. The method I have found so useful is extremely simple. A dilute solution of cyanide of potassium is prepared, and to it are added a few drops of a solution of tincture of iodine, such as may be obtained at any chemist's shop. The prints are either immersed entirely in the solution, or it may be applied locally with a tuft of cotton wool. It is better to make a few experiments with a hopelessly bad print, as it is only possible to find out the proper strength of the solution from ex-

perience. An over-exposed enlargement with degraded whites can be sometimes saved by using a slightly stronger solution, and reducing the faint deposit of silver on the high lights.

By local application with a brush or cotton wool, it is possible to save a print that has been over-developed, or is too dark in places. I have never been able to reduce bromides with ferricyanide and hypo without producing a mealy appearance, especially if the print was on rough paper. This mealiness never shows when iodine and cyanide are used.

Its chief use, however, is for removing stains.

THE EXHIBITION OF 1897: AN IMPRESSION!

By Redmond Barrett.

Visitors to this year's Exhibition of the Royal Photographic Society cannot help but be struck by the specimens of portraiture now on view at Pall Mall. Their astonishment will not be caused—at least, I think not—by the super-excellence of the subjects themselves, but by their rarity. Personally, I was nothing short of amazed to see so few exhibits of portraiture, whereas some very few years ago matters were quite the other way. This must be looked upon as a very distressing fact, and most unsatisfactory state of affairs for many of us—indeed, I might say *all* of us—interested in or depending upon photography as an art or as a business. I think it well worthy of our attention and very considerably to our interest, to seek for the cause and remedy it. If left to go on in its own sweet way, I feel sure it will destroy our prosperity, as it now more than seriously menaces it.

Why should portraiture thus be relegated to a back seat when it should be in the forefront of all other branches of photography? Are the sitters to blame—or is Photography—or are *we*? The possibilities in this particular line are inexhaustible. Do we make sufficient use of them? I could name several that have never even been attempted by photographers. And why not? Perhaps they may have some sound reason which I do not know of, and so matters go on as nearly as possibly in the way they have always done. I feel confident it behoves us to be more alive to novelty—artistic novelty—and not plod along the beaten—well-beaten—track that has done duty and served our purpose for the last quarter of a century. There should be novelty and variety, in an artistic sense, to attract the ever-growing and improving tastes of those who, by their patronage, support photography. Experience teaches me, too, to insist that the prevalent over-retouching of negatives has tended to lessen the importance of portraiture, and is now looked upon with contempt by those who some while ago thoughtlessly accepted it. For a long time it did not seem necessary that a photograph should be like the original so long as it was a smooth and beautifully finished picture. If three members of a family were to sit, each bearing strong family resemblance, I don't think I am overstating facts when I say the best way to recognise each would be by the dress or the number on the back of the mount. Is all this as it should be? I dare to say it is not, the public have seen through it, and I back my opinion by saying that the house in London which has done the best business this season is one where *likeness* has *always* been

considered of the first and most vital necessity. This must mean something, and we should take it as an object-lesson. Better-class labour is necessary to produce good and striking portraiture—not so for highly-finished and smoothed-up photographs. In proof of this I can show photographs by very small photographers that will compare more than favourably with those by the best London houses, that look upon the smoothing style as the one most desirable. Likeness and high finish are not at all antagonistic, but they rarely go successfully together, nowadays. The cause is easily found if honestly sought for, and, I feel sure, is worth the finding. Let us hope a better state of things will rule by next Exhibition, and that the walls of the Royal Photographic Society will be covered as numerously as before by successful portraits, and so reinstate portraiture in the place it has lost—through no fault of its own. We can think it ours, but we won't say so.

THE TESTING OF MODERN LENSES.

By Philip Jourdain.

The testing of modern lenses against one another is a far more difficult matter than was the case with those to which we had become accustomed before the new order of things—Jena glasses and anastigmats—revolutionised the whole science, yes and art too, of photography.

The reason for this is that our modern lenses are very highly corrected, and the small differences of spherical, chromatic, and astigmatic corrections in different lenses are discernible only with difficulty.

It is also difficult to correctly estimate the field of a lens, as in some cases the definition falls off very gradually, and the question is, where does 'good' definition stop, and where does 'bad' set in? It is a hopeless task to compare different anastigmats in a general fashion, as hardly two species are constructed to fulfil the same object; in one, a large field is aimed at; in another, rapidity and good correction. For this reason, it is absurd to say that one kind is better than another; it depends on the work for which it is to be used.

However, there is no denying the fact that a systematic series of tests of all modern lenses would be of the greatest value, but each section must consist of comparative tests made with respect to one quality or one kind of correction only for the reason stated above.

The qualities, good or bad, of any lens, come under the following headings:—

I. *Rapidity*, depending on (a) the diameter of the efficient incident pencil, *not* on the diameter of the largest stop; (b) the number of reflecting surfaces; and (c) the number and thicknesses of cemented elements.

II. *Angle covered* with various apertures with absolute sharpness. Some standard of sharpness must be employed for this test.

III. Chromatic aberration.

IV. Spherical aberration.

V. Astigmatism.

VI. Distortion.

VII. Flare spot.

VIII. Illumination at different parts of the field.

IX. Mechanical defects.

X. Other properties, such as that of providing two or more focal lengths in one instrument.

Such a table, including in each section all the known modern lenses, would be valuable from every point of view; but chiefly as a reliable guide to the selection of a lens for any particular purpose.

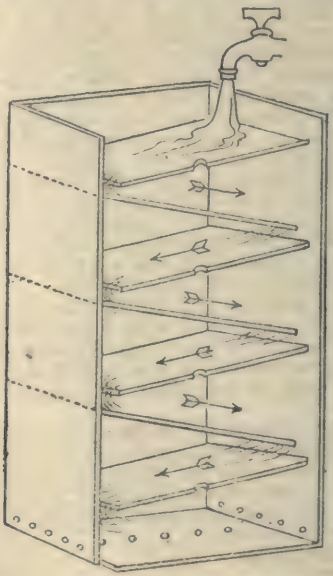
Someone is needed to carry this out; someone who is competent to do so, and whose opinion would be valued. No one, I am sure, wishes this more than do lens makers themselves.

A ZIGZAG PLATE-WASHER.

By G. G. Mitchell.

I wish to describe a very simple, but very efficient and compact, washing box for negatives. Any one with even rudimentary skill in carpentry could make it for himself.

Say that a half-plate washer is wanted. Put together a simple box of the pattern shown in the diagram, or adapt any likely one for the purpose. Let its internal lateral capacity be a trifle larger than the size



of plate to be washed, say, 7 × 5. The top requires no covering, and one side must be either hinged or removable. Fix on alternate sides of this upright box six or more sloping shelves, one over the other, as

shown, allowing half an inch or so free space at the lower end of each for the escape of water to the next plate below, and on these inclined planes place the fixed negatives, which can be kept from slipping by a couple of small pins. Replace the side, and, standing the box in a sink, turn on the tap, so that the water will fall on the top shelf, and rush downwards over each plate in succession, thus quickly carrying off the hypo, which may be allowed to escape by a perforation at the bottom. It is obvious that smaller sizes can also be washed in this box. A notch in the edge of each shelf permits the easy removal of the negatives.

It is unnecessary to make such a washer quite tight at the joinings. It will be sufficient to provide that the stream of water properly floods each plate in turn. If desired, the inflow and outflow can easily be adjusted to keep the box full, while, at the same time, the rush is downward, carrying the heavier hypo with it.

Dimensions are not of much consequence so long as efficiency is secured. A space of three quarters of an inch between the foot of one plate and the top of the next under it is suitable, and any ordinary number of negatives could be accommodated by constructing the shelves to hold three or more each.

This plan of washing keeps the work safe from damage when a lot of plates require attention at once, instead of having them distributed under different taps. A box made for whole plates and under would be most suitable for studio use. Not the least valuable feature in this washer is the direct and active impact of moving water over the face of each plate. The mere placing of a batch of negatives in a large vessel with an inflow which finds its exit anyhow is little better than soaking them. In the zigzag washer they can be depended upon for being well and quickly washed. In the case of a strong rush of water the top shelf should be empty.

THE KEEPING QUALITIES OF FILMS.

By Harry Selby.

It would be highly instructive could we obtain an authoritative opinion upon the effect of exposure to light upon the keeping qualities of an emulsion. A remarkable article recently published in a contemporary has a tilt at the question as regards celluloid films, and the presence of certain chemicals in the film support is strongly hinted at as being at the bottom of the mischief which frequently occurs between exposure and development. But the mischief is apparently not confined to celluloid films. I remember some years ago exposing some dozens of half-plates, manufactured by a well-known firm of high repute, and finding, on developing them, curious markings along three sides of the plates. I showed some of them to Mr. J. Desiré England, who was at that time well known as a plate maker, and he informed me that the defect was due to a fault in the drying of the emulsion. He also said that if the negatives were developed *very soon after exposure* the defect would not appear. This opinion was verified by the fact that six which I developed two days after exposure were free from the phenomenon, whereas the remainder, which I was prevented from developing for some six weeks

or more, were all, without exception, afflicted. Now here is a case in which the time which elapsed between exposure and development was a factor. It is true there was a disease to start with, viz., the uneven drying of the emulsion. But still the question has to be answered, 'What was the nature of the action of light which went on as it were gathering strength gradually?' Why did it not show in the negatives developed immediately after exposure?

It is certain, beyond all doubt, that in the case of celluloid films the deterioration of the emulsion after exposure is much more rapid than with glass plates, and I believe I am not wrong in saying that it is more so with rapid than with slow emulsions. It certainly is my own experience, dearly bought. The tendency appears to me to run in the direction of producing insensitive spots, of apparently the same nature as those observed frequently in stale plates. But I am also inclined to agree with the writer of the article to which I have referred (I think I am not wrong in stating this to be his contention—I have not his article before me) that the effect is towards fading of the image—in other words, slowing of the emulsion. I have certainly found on developing rapid films, which have had what should be undoubtedly over-exposure, evidence of unmistakeable under-exposure—I speak of cases where some weeks have elapsed before development has taken place. No doubt, in order to put the matter on a scientific basis, it would be necessary to expose some half-dozen films on the same subject, with the same exposure, and at the same time, and develope them at different intervals of time. The effect could then be watched and carefully noted. If the pyroxylin in the film is at the bottom of it, it is a matter of some importance to discover if some non-conducting film could not be interposed between celluloid and emulsion. It is a question more for the chemist than the photographer, but it is a matter that largely affects the latter, and if some means cannot be discovered of first localising the mischief, and afterwards nullifying it, there is no doubt it will seriously affect the future of celluloid films as against paper or glass. The many advantages which films possess are not sufficient to outweigh the evil of uncertainty which now besets the path of the worker with celluloid.

DISHES.

By H. Hands.

Dishes are as necessary to the photographer as is clay to the brickmaker. 'Of course,' you will say; 'tell us something we don't know.' Happy is the man who has a plentiful supply. But you do not want bare aphorisms, and past experience having taught you that the Editor accepts no nuts without kernels, you naturally wonder how long it is going to take me to get through the shell of this one. Here it is.

Take one—or a dozen, according to requirements—kerosine oil tins; empty, of course. Or, as an alternative, a piece of zinc lining of an old packing-case. If it be unrusted and the coating of tin intact, all the better. Cut up the tin into square pieces large enough to take one, two, or more plates of the size you work, *plus* each way twice the depth you wish them to be. To make the matter plain, let us suppose you want

dishes for half-plate to be three-quarters of an inch deep. Cut your pieces $8\frac{1}{4} \times 6\frac{1}{2}$ inches, and mind they have been cut perfectly rectangular. Now clean the flat pieces with Monkey Brand Soap, or wood ashes; wash

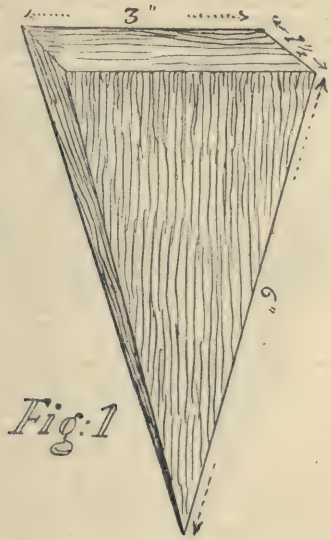


Fig. 1

and dry. Mark off with straight lines three-quarters of an inch from edge, fig. 1A. You now require a tool like fig. 1. It may be iron or hard

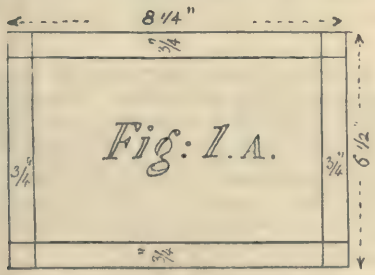


Fig. 1.A.

wood, preferably the former, and must have straight and square edges at its thick end, if you want to do your work nicely. I have given what I think should be the *minimum* size, a larger one would be better. The

sharp end is pushed into the ground, or dropped into a hole in a bench or table—anywhere convenient so long as it is firm and does not wobble about. This is for knocking up the edges of the pieces of tin, and is used as shown in fig. 2, its edge coinciding with the lines marked off on the plates, while the marked-off margin of the latter are hammered down as shown. The tin plate must be pressed firm and flat on the top of the block, fig. 1, or it will 'spring,' and then it will be difficult to get the dish flat. Don't hammer down the sides with heavy blows. You must first hammer it gently along each side, so as to get a sharp, clean angle. This is managed by seeing that the marked line on the tin plate is exactly

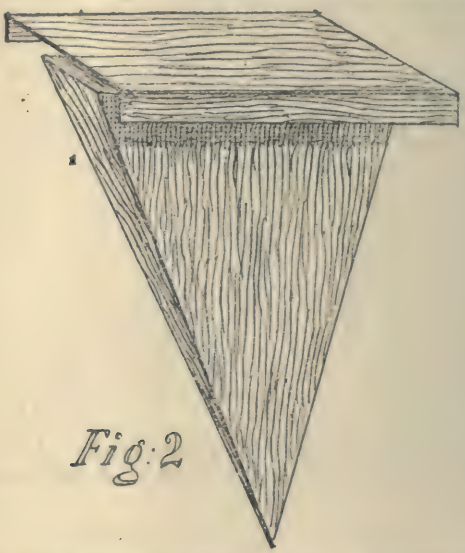
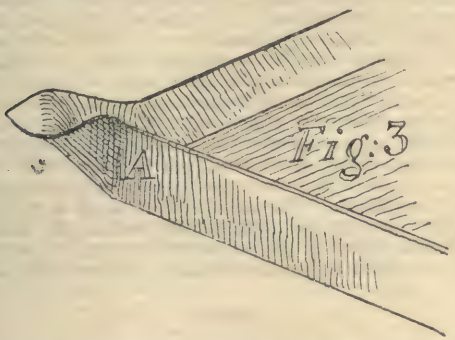


Fig. 2

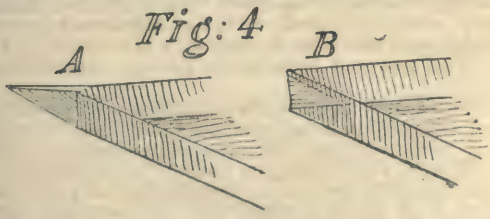
on the edge of the block, pressing well down on the latter, then tap along the tin, striking it at the marked line. This will cause it to bend slightly over, and the angle will be clean and sharp. Go round the four sides in this way. Keep going round the plate, bending the edges down *a little at a time*. You will now find the corners bulging. You must now place one corner of the dish fair on the corner of the block, and fashion the lip for pouring. This is done as follows; only *two* lips need be made—diagonally opposite each other. The corner of the dish being flush on the corner of the block, give the tin a tap first one side the lip, then the other, alternately. The lip will continue to bulge out. Continue this till the angles of the lip marked A, fig. 3, nearly meet. Your hammer must have a face of small diameter, so as to go into this angle. Next fashion the other lip in the same way. You need not be a tinsmith or an expert. Tap carefully at the place marked A, on each side the lip,

and you will be surprised to see the lip take shape itself, as it were. The other two corners can be hammered up close to the corner of the block, and then doubled over to one side and hammered flat, as shown at A and B, fig. 4. Having fashioned the corners, hammer down the sides to



the angle desired, either straight or sloping. The dish being fashioned to your liking, give it another scrubbing with soap or ashes; wash and dry. Melt equal parts of pitch and common resin in an empty jam tin (well cleaned), or any suitable vessel; hold your dish with pliers, heat well, and brush the melted and hot mixture all over it as evenly as possible. Keep the dish near the fire while coating it. Then put aside to set and cool. It is as well to give it another coat of the mixture as soon as the first is well set. For knocking up the sides of the dish the family flat iron may be used as a makeshift, and the largest pair of family scissors may be successfully used to cut up the tin, but, if you are married, your standing in the house will decide what risks you run in doing so.

Larger dishes—and deeper—for washing prints, and for all work except toning, may be made in this way. For fixing and alum dishes the coating of pitch mixture must be thicker than for other work, and an



eye must be given to see that the coating is in all cases always intact. If chipped at all, clean the dish well, and give it a fresh coat. I do not mean that the old coat need be removed, but that it is freed from grease, &c. *Heat well* before re-coating; you will then get it quite even.

It is an excellent plan to mark each dish so as to denote what it is used for. For instance, out of fairly thick paper letters, as P=pyro; H=hypo; T W=washing prints for toning; H W=washing after fixing. Stick these letters on the bottom of dishes (*not* inside) after the first coat of pitch mixture, and while latter is still hot and soft. Then the second coat will cover and protect them. Being a little in relief, they can be both seen and *felt*. The latter circumstance is useful in the dark room.

A word of caution may be necessary to some in regard to the mixing of the coating mixture of pitch and resin. The resin should first be melted in a vessel considerably larger than would be necessary to hold the quantity of the mixture it is proposed to melt down; I use a kerosine oil tin. The pitch is then added a little at a time. If the pitch be melted first and the resin added all at once, in a few seconds the mixture will rise and flow over the sides of the vessel into the fire, and cause a flare-up that might prove serious. To coat dishes of small size I do not use a brush, but, after melting the mixture and heating the dish, I dip the latter into it with a pair of pliers, and let the surplus drain off. The mixture will be found a first-class coating for developing and washing sinks.

EXHIBITING ANIMATED PHOTOGRAPHS.

By G. R. Baker.

When the cinematograph was first introduced, operators had some difficulty in keeping the film in perfect register, especially on first starting the subject, although the greatest care was taken to see that the pins of the sprocket wheel engaged in the perforations of the film and the clamp, rocker, &c., were properly attended to. With improvements in apparatus and extra care in cutting and perforating the films, this has been neutralised to a great extent, but that it has not been entirely overcome is emphasised by the fact that in an otherwise good display I witnessed the other evening at a small public hall, one film failed by jumping out of position after a very small portion had been shown. As a result, it was shut off, and another film was shown. If a little attachment I had made for an apparatus I was interested in some time ago had been in use, the film could have been readily readjusted, and, what is more, tested without the audience seeing the result. As this attachment is useful in all delicate projections, where the demonstrator is anxious to know if the result is as he desires it to be before showing the audience, I will describe it.

After fitting up any apparatus for projection and focussing it for the screen, a miniature of such projection can be obtained by placing a convex lens of moderately short focus (say three inches) in front of the ordinary objective, and holding a piece of card, blackened paper, or metal, according to the intensity of the light rays, at a postion that gives a sharp image of the projection. This will be found, with the lens mentioned, to be about four inches from the lens. A good method of attachment is to cut an aperture in the ordinary flashing shutter of front, let in a cell, and in this fit the lens; then fit a little boss below, and into this adapt a tube or square, on which a sleeve will slide carrying the

miniature screen, and which can be thus brought nearer to, or further from, the lens, so as to get an exact focus.

In practical work the film will be put into position, the light turned on, and, with the cap of objective closed, the light passes through the convex lens on to the miniature screen, which need only be just large enough to focus the small picture, and prevent the rays passing on to the regular screen. The handle of the cinematograph can now be turned for a few of the pictures to be projected on the miniature screen, and, as soon as it is seen that all is satisfactory, the shutter of the objective turned aside, and with it the lens and miniature screen, and the rays allowed to pass on to the regular screen in proper focus for the audience to see. Another method of attaching this lens is to mount it in a cap that will slip over the front, and have a small wooden or metal screen hinged or supported from the lantern baseboard.

Another point that cannot be too strongly emphasised is that no cinematograph should be used without a water trough between the light and the film, for, although there is not much danger if the film is only allowed to remain in the focus of the rays for a second or two, it might be that the operator, by omitting to insert the shutter or metal mask to shut off the light, left it exposed for some time, and then the film would catch light, as it did at a place near Bradford, and, if the subsequent development was the same, a panic might ensue. According to the local reports given as the results of an interview with the operator, the film, after catching fire, broke away and fell into the basket below the apparatus containing the used films, with the result of a fizzle and flame that those who know how celluloid burns can realise.

If any readers of this have not seen the celluloid film, as used for photographic work, burn, let them take a small piece and put it on a plate or stone, and set fire to one corner with a match, and then they will understand why there was a panic when hundreds of feet flashed away on being ignited. The conclusions are—(*a*) Always use a water trough; (*b*) have a winding-up reel or apparatus, as in the biograph and in some of the cinematographs; (*c*) or if the used film falls into a box or basket, have one receptacle for each film, and this fitted with a cover that will prevent more than one film under any circumstances being affected. As regards this last precaution, it is necessary, from a £ *s. d.* point of view, for, with "all the eggs (films) in one basket," the loss is great when an accident happens, and 20*l.* goes to smoke in a few seconds, in fact, almost as quickly as a bank note for that amount could be burned.

BACKED PLATES, DRYING AND CLEANING.

By J. S. Teape.

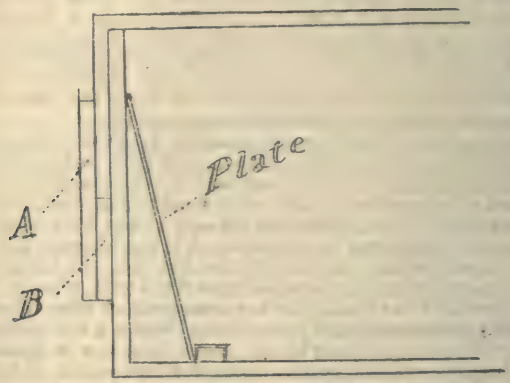
The value of a backing for sensitive plates is slowly, but surely, becoming recognised by all photographers. The very great improvement in results is a matter quite beyond dispute. In the matter of making a backing and its use, and the ease with which it can be done, opinions differ, hence I have ventured to describe my mode of doing it, which I consider easy.

The troubles of backing plates have engaged the minds of several

photographers during the past year. The difficulty of removing the backing appears to have been an item of considerable anxiety when collodion was the medium used. Now, why use collodion, or any other inferior backing, when there is one which it will be impossible to beat, if to equal? That one to which I refer is caramel. Oh, that messy stuff! Yes; but there is no need for any mess if only a little simple system is followed, which I will try to explain further on. I have not found anything to equal it in all my experiments but asphaltum, which is rather too much trouble to remove.

The efficiency of caramel is ample return for the small extra work in making it, which you must do if you want the best. The matter of efficiency brings to my mind a show of lantern slides from negatives by a renowned photographer. In several of the subjects a very large amount of halation was present. The plates had been backed, but not with caramel.

Among the photographers I have met who have not attempted to back their plates, several have been prevented by the necessity for a drying cupboard. Here is a very simple way of meeting this difficulty. Get a strong cardboard box an inch deeper than the longest measure-



ment of your plates; run over the corners inside with black paper, to be sure it is light-tight. On the bottom, inside, glue strips of cardboard, half an inch wide, a short distance from the sides of the box, to prevent the plates from slipping when stood up against the sides. By placing the plates in this way a good number can be put into a small box. The next thing to do is to make the lid light-tight, which is easily done this way: Under the edge of the lid, when on the box, glue strip, B; on B glue A, covering over the edge of the lid an inch or more. When the lid is put on, it will slip into a slot made by A and B. A box like this is very useful during the winter months, as, if your dark room is not warm, you can take it into a warm room to assist the drying of the backing. The other parts of the operations are the coating and cleaning off of the backing. I strongly advise the use of a two-inch hog's-

hair brush for coating all sizes of plates. This should be lightly charged with the solution, so that a thin coating is given. It is important to remember that a thin coating is effectual when caramel backing is used. If I want the plates in about half an hour, I see if dry or not; if not, they are generally dry enough for the application of sheets of common tissue paper, which I always apply. If the plates are dry, I breathe a little on the backing, which quickly creates a tackiness enough to cause the tissue to adhere. The paper is easily cut to size by folding a few sheets a little larger than the plate, placing the glass plate on the paper, and cutting the lot round with the scissors. After the exposure, I take a jug or dish of water and a sponge, moderately charge the sponge with water, and wet the tissue all over; by the time you have put the sponge down you can take the tissue by the corner and pull it off, double up the paper with the fingers, and rub off the backing with it. Press water out of the sponge, and finish the plate by a few strokes. All this takes much longer to write about than it does to do it. The use of the tissue I can highly recommend, as it enables you to put the plates into slides before the backing is dry, and to simplify the removal of the backing.

THUN FOR THE CAMERA.

By Rev. E. Healy.

Having been asked by the editor for a short contribution to our Almanac, I cannot do better than describe the advantages to the photographer of a sojourn at this charming little town. Thun is too often merely passed on the journey between Berne and Interlaken, or sometimes the transient visitor, being obliged to spend a night or part of a day there, describes the place as a 'dull hole.' But I am sure that there is in Switzerland no more enjoyable spot for a week or a fortnight's stay than pretty little Thun. First, there is its beautiful lake, with the giants of the Bernese Oberland towering up at the end of it; then the glacier-fed Aare, dashing with its emerald-green waters through the town, like the Reuss at Lucerne; while at every corner in the town the photographer comes on the most charming 'bits'—much more numerous than in Lucerne. Let him mount the covered steps to the old twelfth-century castle and the church, from whence he will view the town stretched below him, and, beyond, the lake, with the ranges of the Stockhorn and Niesen and the snow-clad giants in the distance. On the market-day there is any amount of studies in costume and picturesque country groups.

The railway, to Berne in one direction and to Interlaken in the other, and the steamboats on the lake give every facility for excursions. For instance, by starting early in the morning one can go to Interlaken, up to the Lauterbrunnen valley, over the Wengern Alp by mountain railway to the height of 7000 feet, passing within three miles of the Jungfrau Mönch and Eiger, descending to Grindelwald and down its valley to Interlaken, and thence home to Thun in time for supper. For those who like to tramp about, the steamboat or railway will drop you at any of the lakeside stations, whence you can mount up to St. Beatenberg, or stroll up the valleys of the Kander or the Simme, finding a superabundance of subjects for the camera in the way of mountains, châlets, rushing streams,

and rocky gorges. Again, should you be disposed for a modest climb, there is the Niesen, 7000 feet high, practicable for a hand camera, as there is a bridle road nearly to the summit, which commands a view as fine as that from the Rigi or Pilatus. Closer, in the town, there is a walk through the pinewood at the back of the Belle Vue Hotel, which in about ten minutes brings you to a summer-house whence you see the whole range of the snow-clad Bernese Alps from the Finsteraarhorn to the Doldenhorn spread before you. But I must pause, only observing that you can be lodged and boarded at the famous Pension Itten at the cost of five francs a day (this is about five or six minutes out of the town); while at the Hotel Belle Vue you will find as good accommodation as at any of the 'swell' hotels at Interlaken for about eight francs a day.

N.B. at the latter hotel there are *two* dark rooms.

THE AERIAL FOCUS.

By J. Leisk.

Understanding that contributors to the Almanac do not necessarily supply original matter, but rather write from their experience of things photographic for the benefit of their less advanced brethren in the art, I do not apologise to 'those who know' in choosing the above subject, for I can remember when someone writing on photo-micrography said that in focussing he dispensed with the ground glass of the camera, and put a plain glass in its place, using the *aerial focus*, I had to confess I did not know how it was done, and finding that my friends could not enlighten me, I had to cypher the thing out for myself as best I could, since when I can hardly overstate the advantage it gave me when absolute sharpness of definition is required, such as in copying or in taking subjects for stereoscopic work, the lantern, or for enlarging.

It goes without saying that the aerial focus of the lens lies in the same plane, and coincides with the image on the ground glass of the camera when the latter is sharply focussed. But how can we tell when it is absolutely sharp? The best that can be done with ground glass may only be a compromise, as I will presently show.

Let us, in the first place, render a spot near the centre of the ground glass transparent by cementing on a microscopic-slide cover glass on the ground surface with a drop of Canada balsam, and then we shall select some printed matter, such as a poster or hand-bill, just too far off to be read with the naked eye. Adjust the camera towards it, carefully focus, and examine the image on the ground glass with a powerful lens of *not more* than half an inch focus, when, instead of the letters, all one will see is the rough surface of the glass much magnified, with possibly a very indistinct trace of words thereon, while turning the focussing screw either way will make little or no improvement.

If, now, we take the magnifier, the focal length of which we will assume is exac[illegible] inch, adjust it over the clear spot in the glass, and exactly ha[illegible] focus [illegible] *the thickness of the glass*, therefrom, its box 1. will, of [illegible] surface o[illegible] same plane as the further or ground room is [illegible] and examine place his eye *close* to the magnifier ing of the ba[illegible] t poster. If, *by chance*, it has been cleaning off c

correctly focussed, he will be able to read the words with ease; if not, a turn of the screw will make them perfectly distinct, and he will be astonished to find how a small movement of the screw will either blur or sharpen the image.

Now, what he has accomplished is, to bring the aerial focus of the camera lens into the same plane as that of the focussing lens, through which latter the image of the poster is seen, much magnified, of course, and so details too distant to be seen by the eye are rendered clearly visible; in other words, the two lenses form a compound telescope (minus the second or erecting eye piece), and, as the ground glass and future sensitive plate occupy the exact plane where the foci of the two lenses meet, the resulting negative will be absolutely sharp, and will stand enlarging up to any reasonable extent without fuzziness or loss of definition.

In practice, the focussing lens *must* be of *short* focus, otherwise it gives too much latitude, and may best consist of two double convex lenses mounted a short distance apart in a tube which slides or screws into another, so that its exact focus can be found in the following manner, and when so adjusted it is better to have a binding screw to fix the tubes in that position for future use.

Place a scrap of gauze or fine net on the window pane, cover it with a piece of common glass as thick as the ground glass of the camera, place the tube of the focussing lens upon it, and focus the gauze sharp through the glass. If now applied to the camera ground glass, its focal plane will exactly coincide with the further or ground surface of that glass, and when placed over a transparent spot, will show the aerial image when it falls in the same plane.

Focussing lenses as described are sold by opticians, or one of the lenses mounted on a tripod, having a screw adjustment, and which are used for examining flowers, will answer the purpose.

As the ground glass will still be wanted for composing the picture, two spots on it can be rendered transparent as described, one near the centre, and the other near the margin, or the ground glass can be removed, and a plain glass, coated with matt varnish, substituted—the transparent spots made by scraping off the varnish. I have tried both methods with success.

THE FOCUSSING SCREEN AND ITS SUBSTITUTES.

By Rev. F. C. Lambert.

By focussing screen we here mean the ordinary ground glass which we are accustomed to use as a focussing screen. Now, it must be within the experience of most people that to be provided for accidents seems to prevent them happening. Therefore, as to the photographer, it may be well for him to be provided with some makeshift or substitute for the broken ground glass, so that his foresight may act as a charm against the accident happening.

The following have been suggested and are efficient in varying degrees:—

1. Common ground glass, such as is usually obtainable at the glass-

cutter's shop in most towns and large villages. This, rubbed with oil, glycerine, vaseline, or other non-drying fluid, does very well for the time.

2. Common glass, dabbed over with putty.

3. Ditto, varnished with any clear-drying varnish, and then grained with a bit of rag dipped in powdered pumice-stone or powdered glass, &c.

4. Ditto, (*a*) coated with matt varnish, or (*b*) coated with gelatine dissolved in milk—say, twenty grains per ounce—and applied in the old collodion style.

5. An undeveloped gelatine plate is fixed, washed, soaked in a ten per cent. solution of barium chloride, rinsed, and then bathed in sulphuric acid (five per cent.). This precipitates barium sulphate in the layer of gelatine.

6. A plate is exposed to daylight for a second or so, developed, fixed, washed, and bleached in saturated solution of mercuric chloride.

There are still a few other substitutes; but, with these half-dozen arrows in one's quiver, it is hardly likely that some one of them may not be used in case of emergency.

A FEW INDIAN WANTS.

By Geo. Ewing (Calcutta).

Wanted, a medium for the publication of the needs of Indian amateurs. To some this may appear a strange want, considering that there are already in existence Indian journals avowedly devoted to the interests of amateurs in the East, but the wonder will disappear if the papers are themselves consulted. Whatever may have been their original purpose, their conductors have transformed them into records of aimless voyages and travels, and are now, in a lucid interval, endeavouring to infuse variety with pointless cycling notes. Certainly not by such means will the sympathies of that noble army of men who minister to our wants be enlisted on our behalf. That will be possible only through the unparalleled circulation of the Almanac, and in it therefore I crave a little space for the specification of our requirements.

Wanted, steel camera cases. Dealers, in persisting in sending us camera cases of leather, wood, and canvas, must be either very conservative or very oblivious of Indian exigencies. Very little knowledge of this country should show them that the age of iron has set in. Whereas a decade back travellers pinned their faith on leather portmanteaus and Saratoga trunks, steel trunks alone are now considered suited to the accidents of Indian wayfaring. Wood is apt to attract white ants, leather is heavy and expensive, and canvas is no protection against hard knocks and rough usage. Steel, on the other hand, is light, strong, cheap, and a perfect safeguard against the thousand-and-one pests and dangers attendant on campaigning in the East. Painted or varnished, it will *not* rust, let cast-iron cretins say what they will; but, unless a demand is created, it will be impossible for amateurs to obtain their wants at reasonable rates. When I was in England last year, I tried ineffectually to get a well-known steel-trunk manufacturer to make me a dust and damp-proof case for my 15 × 12 camera at the price charged for a uniform case of the same capacity. I was told that the cases obtainable commercially for a few shillings were priced low, as they

were made in regulation sizes by thousands, and that variations from the standard dimensions raised the rates enormously. Obviously isolated amateurs cannot give large orders so as to raise the usual photographic sizes to the dignity of trunkmakers' prototypes, but dealers can.

Wanted, less brass and more honesty. If the steel boxes are, like uniform cases, made damp and dust-proof, that terrible bogie, the Indian climate, may be defied, and brass bindings relegated to the limbo of useless photographic fads. I have for years held that brass binding is not necessary for India when *good seasoned wood was used and the workmanship was honest*, and I shall die in that faith. The cases brought to my notice of unbound cameras going to pieces during the monsoons have only proved the necessity for honest carpentry, and not brass binding. When I was in Europe, I got a little-known maker to make me a large camera of the latest pattern, but with no metal binding. The man at first positively refused to 'risk his credit' by following my instructions, and it was only when he saw that he was in a fair way to losing the job that, 'for his own reputation,' he made me the camera with finest Spanish mahogany and extra strong joinings without brass. The camera is now before me, as good as ever. Cannot others use 'finest Spanish mahogany and extra strong fittings?' Brass, like charity, cloaks many sins, and its absence will be the best guarantee of honest work and materials. Nothing else will do for India.

Wanted, centre-draught lamps for optical lanterns. I have often seen advertisements of 'Indian-pattern' lanterns, fitted with oxyhydrogen jets, platinum prints, lime adjustments, gas bags, retorts, &c. They are about as useful to us as breeks would be to the traditional Highlanders, or flannel shirts to the natives of Central Africa. Dwellers in the East must, for years to come, depend on petroleum, and that maker would score heavily who, recognising this fact, would give us oil lamps on the centre-draught principle. For years all the centre-draught lamps in household use in India were 'made in Germany,' and English manufacturers reluctantly followed only when the lamp trade had almost slipped from their hands. Will nothing short of a German invasion lead them to give us also centre-draught lamps for our lanterns?

NEGATIVES BY POST.

By S. Herbert Fry.

Every photographer wants occasionally to transmit negatives by post. The following 'negative' rules have been found to ensure safety:—

1. Don't nail the lid of the box, if a wooden one. A tightly strung box is quite secure enough. Negatives are often damaged by a clumsy person when opening a nailed-down lid.

2. Don't write the name of the addressee on the package itself, but on an attached tag label. The postage stamps must be attached to the label. The Post-office officials are only required to obliterate the stamps, and not to smash up the box.

3. Don't pack so that the contents are loose and can be shaken.

4. Don't use *crumpled* paper, or sawdust, or cotton-wool for packing. The best thing is corrugated packing-paper, cut to drop into the

box. The next best thing is ordinary brown or newspaper, cut to size, and used quite flat. Brown paper has no reading matter upon it. This often saves time.

5. Don't worry about wood boxes. An ordinary cardboard box, with a piece of 'eight cut' backboard on each side, makes a safe parcel.

6. Don't omit to put a name and address inside the box, in case the tag label is torn away.

7. Don't forget to put a Post-office 'Fragile' label on the parcel to comply with the Post-office rules.

8. Don't attempt to send negatives by letter post.

TRADE UNIONISM ONCE MORE.

By J. A. RANDALL.

ON receiving the ALMANAC of last year, I was flattered to discover that directly and indirectly I had been the cause of monopolising eight pages of the Editor's valuable space. My first elation, however, was somewhat discounted when I found that seven of the eight were from the pen of that redoubtable gladiator Mr. Arthur G. Field of Maidstone, who was 'pitching into' me and my trade unionism. Some readers may have thought that the pages had been better occupied, though I need hardly remind such that the subject of trade unionism is of considerable importance to thousands of photographic assistants. For this reason I return to the matter, trusting that those who find no interest in trade unionism will not begrudge me a few pages.

'Why take the ALMANAC?' you ask. I answer, because I have a lively recollection of the time when the ALMANAC was the only photographic literature in which I indulged, and knowing also that many photographic assistants who rarely take up a photographic periodical yet make it a kind of religious duty to purchase and read the Daniel Lambert, the fattest and weightiest of photographic annuals.

In the article referred to, *A Trade Union for Photographic Workers*, Mr. Field states a grievance against me, and proceeds to criticise my work, *The Photographic Worker*, the grievance being that in this pamphlet I had simply recapitulated his writings on trade unionism in THE BRITISH JOURNAL OF PHOTOGRAPHY and elsewhere during the years 1889–91 without acknowledging the authorship, not so much the literary form as the ideas put forward.

This recapitulation I deny, and also deny that I have any desire to rob Mr. Field of the right in ideas he thinks essentially his own; furthermore, had I have imagined he claimed such a right in what are the elements of trade unionism, I should have refused absolutely to recognise the claim. My pamphlet puts forward nothing, nor are the parallels Mr. Field gives to make good his case anything, beyond what has been the common property of advanced organizations for many years previous to 1889. Besides this, I neither claimed the originality of applying trade unionism to photography nor private property in the ideas set down. This being so, it is difficult to determine the rationality of Mr. Field's protest. What my objector forgets is, that he has first to make good his title to be regarded as the originator of the principles of trade

unionism before he can demand the slightest acknowledgment from an author. This he has not done, but assumed a virtue though he possess it not.

The most that can be urged against me is that I did not mention Mr. Field in this connexion, though I had already done so in THE BRITISH JOURNAL OF PHOTOGRAPHY, April 19, 1895, as follows: 'The formation of a Photographic Assistants' Union, as suggested by "Assistant," to deal with instances of injustice as I described under *A Hard Case*, was attempted a few years ago. A full account can be found in the JOURNAL of 1889–90. This attempt was headed by Mr. Arthur G. Field, and failed mainly through the indifference and non-support of assistants themselves.' Mr. Field would like to have seen these facts repeated in *The Photographic Worker*. So would I until I read an article of his in the ALMANAC of 1894, where he wrote of this attempt as follows: 'Our *fiasco*, which seemed very serious then, but which time has softened into the aspect of a burlesque tragedy, was not hailed with great exultation by the employers.'

Reading this, I decided to omit any reference, knowing that a person of Mr. Field's sensitiveness—a sensitiveness that leaves gelatine dry plates far behind—would prefer to forget that, in callow youth, he was the leader of this '*fiasco*' and 'burlesque tragedy.'

This little personal matter disposed of, Mr. Field proceeds to make clear the 'remarkable continuity of this movement for unity among photographic workers, and its identity under its various phases and its different spokesmen.' As my critic says, I deny this identity, and even go so far as to assert that the unionism I advocate is opposed, 'in aims and in ways and means,' to the earlier form. To bring out the identity, Mr. Field compares passages from his own writings with others from my pamphlet; but these comparisons, as I stated above, prove nothing beyond the fact that on certain objects, common to all trade unions, the stock in trade, we are, and must be, at one; he has still to compare the larger part, *i.e.*, aims, policy, ways and means, and, most important of all, finances.

Following Mr. Field's example, I also will give a comparison. In the JOURNAL, December 6, 1889, he defined trade unionism as under: 'A trade union, that is to say, an organization open to every operative photographer in any branch, subject to a technical qualification, founded for the support of the workman in trade disputes.' In the *Photographic Worker*, page 21, I wrote thus of trade unions: 'The aggressive side of trade unionism is of necessity the most pronounced, and gains an undue importance in consequence; in reality it is only a small part of the many functions that a trade union performs. A well-organized union will attend to every phase of a worker's life which has any connexion with business, in a less degree with his social life, and in no way with the religious life.' From these two quotations it is obvious that, whereas Mr. Field considers a trade union as founded mainly to support workmen in trade disputes, I regard this as only a small part. How two schemes can be identical in which the chief business of one becomes a comparatively unimportant detail in the other, I leave with my critic to make clear.

This difference may seem trifling at a first glance, but in reality it is vital. The test of any organization, whatever may be its professed

principles, is the manner in which it proposes to spend its income, I give in tabular form three statements—(1) as Mr. Field proposed; (2) from the *Photographic Worker;* (3) compiled from the report of the National Union of Shop Assistants :—

	1.			2.			3.		
	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
Branch expenses	0	5	3	0	5	8	0	7	0
Central ,,	0	4	4½				0	4	0
Legal protection	0	1	9		—			—	
Trade ,,	0	6	1½		—			—	
Unemployed	0	1	9	0	14	4	0	12	0
Balance	0	0	10½	0	2	3		—	
	1	0	1½	1	2	3	1	3	0

From the above it will be seen that, while Mr. Field estimated spending no more than 1*s.* 9*d.* on unemployed benefit, I propose 14*s.* 4*d.*, and the N. U. S. A. actually spent 12*s.* per head of membership in 1895 on unemployed and sick benefit. What, then, is Mr. Field to do with his surplus? It is, as we see, in agreement with his definition of trade unionism, to be spent on legal and trade protection. No less a sum than 7*s.* 10½*d.* out of every 1*l.* 0*s.* 1½d. received is to go in strikes, reform, agitation, and the law courts. The secretary of a union that spent 1*s.* 9*d.* per head in law would need to live within speaking distance of the police and county courts. Neither the N. U. S. A. nor myself advise spending this large sum in that manner. To me it appears that the unemployed and sick man is the weak part of the defences, and that in supporting him we put ourselves in the strongest position for obtaining legal redress, trade protection, and parliamentary reform. To take 1*l.* from a worker and return but 1*s.* 9*d.* in direct benefit is not my idea of trade unionism, nor is it a proposal likely to appeal strongly to workmen even though they receive full value for the 7*s.* 10½*d.* expended in legal and trade protection. The engineers' union is reckoned the model of all unions, and, according to Mr. John Burns, 'had spent ninety-five per cent. of its income, not on strikes, but in ministering to the sick, and which in fifty years had spent 4,500,000*l.* in unemployed benefit and the like.' This example of the engineers I consider the right one to follow, instead of Mr. Field's proposal of fifty per cent. on legal and trade protection, which, in practical politics, means strikes, lock-outs, and like warfare.

Having pointed out this difference in the root notion of trade unionism, and the opposed methods of spending the subscriptions, it is manifest that something has gone wrong with the 'remarkable continuity' and 'identity under its various phases' that Mr. Field is so anxious to demonstrate, to what useful purpose it passes the wit of man to discover. What unionism he advocated in 1890 is not material to the unionism required in 1897.

Mr. Field is also at some pains to show that my unionism is not based on 'anti-force methods exclusively,' because I advocate using the law courts and Parliament for the redress of grievances. 'Law is force,' says he, dogmatically, and from this notoriously ambiguous premiss proceeds to draw some crude deductions concerning legislation, moral suasion, and force. Into these ethical propositions I shall not enter; the common sense of mankind does not look upon legal and parliamentary action as force, whatever may be the intense opinion of the school of philosophy to which Mr. Field belongs. Photographic assistants, obtaining redress by legal or parliamentary aid, need be in no fear of the Riot Act, nor will the Horse Guards be called out to suppress them as advocates of force. On the other hand, the phrase, 'trade protection,' has an ominous ring, and may imply a good many ugly things.

My critic also refers to the 'interesting anecdotes and stories of injustice' quoted in the *Photographic Worker*, dismissing them as trivial and beneath his notice. He also advocated, in the JOURNAL of July 25, 1890, a crusade against 'rabbit-hutch, cut-throats, and sweaters, purloiners, and detainers of specimens, and fraudulent apprentice-hunters,' though producing no proof to justify this strong language. It was therefore open to any one to get up and deny the existence of the evils. My anecdotes, &c., may seem trivial to Mr. Field, but in a hard and sceptical world they make just the difference between unsupported charges and definite statements capable of proof.

In concluding his article, Mr. Field mentions various gentlemen, amongst others Captain Abney, Professor Bolas, H. Snowden Ward, R. Barrett, as supporters of, or sympathisers with, his attempt to found a union. Against the good intentions of these gentlemen I have nothing to say, but would point out that a trade union is an organization established by workers for the advantage of workers. The foundation principles of trade unionism are common interest and self-help. Photographic assistants should clearly recognise that in joining a trade union they must be prepared to work out their own salvation. An individual, however great his ability, can do little unless he has a compact body of men behind him. To rely on big names is to lean on a broken reed. Whatever injustice photographic assistants suffer under, they will in the end be compelled to remove it themselves, an organization like the National Union of Shop Assistants supplying them, not with the motive power, but with the mechanism of action.

PHOTOGRAPHERS AND THEIR CLIENTS.

By THOS. FALL.

ALL photographers have their methods in dealing with their clients, and, no doubt, very various. Like a true fisherman, if one bait doesn't answer, I try another; you have to study your fish and its surroundings, and act accordingly. I gave an estimate to two ladies on one occasion to copy two *carte-de-visite* heads on china, to go in special cases; the amount stipulated was 8*l.* 8*s.*, with a proviso that, if the cases cost me more than I reckoned for, I should charge more; this was so, and I made an extra charge.

A few days after delivery I had a letter from a colonel in the War Office, written on official paper, to the effect that I had exceeded the estimate given, and that, as he had a witness to prove this, he would defend any action I might care to take; but he had the cheque for the amount he held was right, and would send it if I would forward a corrected statement.

Here was an opportunity for tact; my reply was, that the extra charge was in consequence of the cost of the special cases being in excess of ordinary ones; but, as I was a busy man, I had no time to fight the matter, or keep up an angry correspondence, and I would thank him to return the cheque to the lady, and, as far as I was concerned, the transaction was at an end. Within a week my friend the colonel replied:—

Dear Sir,—Since writing you, I have seen the two portraits and cases, and think them well worth the money charged, and have pleasure in enclosing cheque in full.—I am, &c.

This did not terminate the business, as the colonel called in person and gave me a good order for similar work, only for more money, and sat himself for a cabinet head, which I also put on china.

I can fancy, Mr. Editor, you saying, 'All's well that ends well.'

THE NEW SILVER LANTERN SCREEN.

By JOHN ANDERTON.

THE impetus given by photography to the optical lantern was pronounced, vigorous, and powerful. Upon the other hand, the lantern forcibly reacted, and, by offering to the photographer the means of displaying his pictures upon a large and impressive scale, enticed many to take up the practice of the fascinating science, who otherwise would have remained upon the daylight side of the developing-room door. Improvements were, as a natural consequence, made in the lantern. It was rendered more efficient, less bulky, and less expensive. Much thought, ingenuity, and skill were lavished upon the improvement of all applicable illuminants, including the homely oil lamp. For the latter much was done, and this useful, handy radiant became the friend of many, who, while admitting its usefulness, deplored its limited illuminating capacity, for between it at its very best and a limelight there stretched a vast track of no-light land with no half-way house upon it.

The screen, in common with the light, lenses, &c., received earnest attention, and at length the best portable screen was believed to be the opaque one, faced with distemper. No further advance seemed possible in that direction, and practical lanternists appeared to have unanimously concluded that a dead halt had been called, and that to look for improvement in that direction was a decidedly fruitless and hopeless occupation.

In making experiments some years ago with the object of finding a material that would reflect as received a polarised picture, and so make possible a practical lantern stereoscope, I found that, of the numerous substances experimented upon, one only (metals excepted) was of

the honest nature desired; in other words, all, with the exceptions given, upon receiving a polarised picture, at once, with an interfering spirit of a most annoying description, supplied what they deemed wanting, and, as a consequence, transformed the picture composed of polarised light into one the rays of which were of ordinary, every-day kind. The one material that answered to the demand to mind its own business and refrain from interference was impracticable for screen purposes owing to its greediness in the matter of light absorption, and its possession of other defects of different character that were equally objectionable, and I had therefore to fall back upon the metals, and silver, as the whitest, received first attention. A screen was made, faced with that metal in the form of leaf, and this answered the purpose for which it was constructed. That point being definitely disposed of, I proceeded to compare it with an ordinary screen for the purpose of testing their comparative powers of reflection, and found that the new screen gave astonishing results in the matter of brilliancy, and completely dwarfed all its rivals in this desirable particular.

The silver screen, although greatly superior in reflective power to the hitherto best, had two objectionable failings, viz., its surface was not uniform in colour and tone, and its inability to laterally reflect light was unpleasantly apparent. The latter failing was disagreeably conspicuous when the observer was anywhere but pretty directly in front of screen, for, in any other position, the side of the picture farther from the observer became dark.

Mr. Lewis Wright, the well-known authority on optical projection, experimented with a silver screen, with a view of testing how far its illuminating superiority held when used with a lantern microscope. Its value and reach above all others were obvious to that gentleman, as were the evils already mentioned, which stood formidably forth as barriers to its practical usefulness. To lessen or remove them innumerable experiments were made. White metals in the form of powders were applied by different methods and in different ways, and, although they answered to the call, and gave lateral reflection, they were also prodigal in impartially scattering light in all other directions, and, as a consequence, little in comparison was reflected where it was most needed. Mr. Lewis Wright suggested that the silver leaf should be covered by perpendicular striations, and then the width, depth, and form of the striations best for the purpose were anxious questions that could only be settled by direct experiments. After many of these had been made, each being accompanied by its own special failure, a striation was obtained, which gave of its best freely, and, with a charming sense of justice, gave a lateral and direct reflection that were practically equal within all needful limits, the result being a portable lantern screen that gives a picture of at least double the brilliancy of any other, whatever illuminant is used. Here, then, a successful attempt has been made to advance the oil lamp and Welsbach gas burner some distance upon the no-light land that hitherto lay between them and the far-away position occupied by the lime light. The power of the last-named and that of the electric arc are, of course, increased in a similar proportion, and lantern operators have the means at command of projecting larger pictures than formerly without decrease of brilliancy, or of obtaining the same illumination as formerly with a much less expenditure of gases or electricity.

ENLARGEMENTS FOR HOME DECORATIVE PURPOSES.

By William Fleming.

The possessor of a quarter-plate camera often longs for an enlarged print of some particularly choice negative, and many amateurs now have settled this difficulty by mastering the technicalities of enlarging and producing their own enlargements. This leads to another question, how to utilise the enlargement after it is made. It is quite impossible in the most of cases to frame every print made, as, no matter how enthusiastic the photographer, the line must be drawn somewhere.

The following simple method of getting over the difficulty, and at the same time exhibiting work to the best advantage, may be found useful:—

Get a picture-frame maker to make up a frame of any desired style of moulding. For an 8 × 10 enlargement a good size would be one which would take in a mount measuring about 18 × 20 with a cut-out centre of 7½ × 9½. In place of having the usual backing board to the frame a slightly heavier board is preferably used and made sufficiently small to go into the rebate of the frame. To give a better finish to the backing board it may be covered with bookbinders' cloth. Four small movable turn catches are screwed to the back of the moulding for holding the backing board in position. When it is desired to use the frame, the catches are turned back, the backing board lifted out, and a roughly mounted enlargement placed behind the cut out mount. The backing board is then replaced, and the catches turned to hold same in place. If desired, an extra thickness of cardboard may be put between the enlargement and the backing board, to ensure close contact with the cut-out mount.

With this arrangement of frame, the enlargement may be changed daily, and a different picture will thus always meet the eyes of our friends when they honour us with their presence.

A very effective method of disposing of the frame is to place it on a small size of artist's easel, which may be stained a dark brown colour. If desired, the upper part of the easel may be draped with some suitable coloured fabric, which adds very much to the appearance of the finished article.

PHOTO-LECTURING.

By T. N. Armstrong.

That a good limelight lecture is still appreciated by a large section of the public is a fact that cannot be gainsaid. In proof of this statement, witness the enormous attendance that has nightly thronged the Royal Art Institute during the six weeks' run of the Glasgow and West of Scotland International Photographic Exhibition, and to which there is little doubt the great financial success of this Exhibition is due.

In arranging for this extended course of lectures, the Executive very wisely provided both limelight as well as electric light for the projection of the transparencies on the screen, and the choice of which lamp to use was left entirely in the hands of those gentlemen who were lecturing.

As to the merits of the two systems, opinions, of course, may differ. An analysis, however, of the lecturers who declined to use the electric light is very instructive, and so long as these gentlemen pin their faith, as at present, in preference for the limelight, the electric light will not become popular, at least in the West of Scotland.

That several of those who had their slides shown by electric light were sorry for discarding the limelight is also well known to those who are within the ken, and in one instance especially was it evident, where a very fine set of slides, that would have shown up well with the limelight, were indifferently seen by the aid of the electric lamp.

In the case of two of the lecturers, at least, a considerable amount of speculation was raised as to the manner in which they signalled the lanternist to change their views, the audience being entirely unaware, by any sign or signal, of the intention to change from one slide to another, and yet the lanternist always made the change at the exact moment. In one case no less than 125 slides were changed in an hour and ten minutes without the semblance of a signal being shown to disturb the even tenor of the speaker.

Seven years ago, the writer, in conjunction with Mr. More, the lanternist at the last as well as the present year's Exhibition, invented a silent system of signalling for a change of view by means of an electric wire and battery, and for a time this little arrangement was a veritable puzzle to all and sundry. After a time, however, the *modus operandi* became known, and inferior imitations of the system became as common as penny pies all over the country, the result being seen in the 'press-the-button' apparatus. The original system, however, was very much better than what is now commonly in use, for the loud burning noise, so distracting to many in an audience, was entirely absent in this invention, a small arm, rising or falling like a railway signal, and which was confined in a small box that was detachable from the lamp, being the method originally invented, and used by myself and Mr. More, and so silently did this little arm rise and fall that no one six feet from the lamp could detect its movement.

The secret, however, was out, and, like all other good things, was copied and spoiled by the introduction of a method that is as noisy as the flight of a covey of partridges among the audience.

That very much of the success of an entertainment such as I am considering is due to the lanternist goes without saying, and, no doubt, very much of the credit is due to Mr. More for the admirable system shown at a recent lecture in Glasgow, where the audience and a host of knowing ones were entirely puzzled to find out how the lanternist knew when to change. Electricity had nothing to do with it this time, and yet how simple when one knows the secret.

CRACKED OR BROKEN NEGATIVES.

By Alfred I. Taylor.

There are various ways of treating broken negatives so as to prevent the crack mark showing to any great extent in the print. If the crack is not in a very prominent part of the picture, the easiest way is to back the negative with a piece of glass, binding it down round the edges. This

will prevent the film getting broken. Should the negative be broken in several pieces, these may be cemented on to another piece of glass with Canada balsam, taking care that a little of the balsam gets between the edges of the pieces. Any balsam on the face of the negative may be easily removed with a tuft of cotton-wool moistened with benzole. When printing, the frames should be turned partly around every few minutes, or they may be printed at the bottom of a box.

When the glass only is cracked, the negative film may be stripped off, and placed on another support, either of glass or celluloid, which, to ensure the film adhering, ought to be coated with a solution of gelatine, to which has been added a little alum. Some plates require only to be soaked in water for a few minutes, when the film can be removed by lightly rubbing with the finger, commencing at one corner; with others, the film will refuse to move unless an acid bath be used. Great care must be taken in laying the film on the support not to get the lines out of the perpendicular.

ACETYLENE IN PHOTO-MICROGRAPHY.

By W. H. Walmsley.

The fortunate workers in photo-micrography, to whom direct sunlight, oxyhydrogen, or the electric arc are available, will probably pass this article by unread. Either of these lights is so efficient and satisfactory for this work, that they are, doubtless, satisfied with the one they habitually use, and feel neither inclination nor necessity for making any change. But the vast majority are quite differently circumstanced. To them the best—in fact, only—illuminant is that of the coal-oil or paraffin lamp, very useful and practical, but with so many deficiencies as to cause a constant longing for something better. Hitherto this has seemed unattainable, but the brilliant and highly actinic light of acetylene places within the reach of every one the ideal illumination for photo-micrography. The Welsbach incandescent gaslight was, it is true, a great step in advance of the oil lamp, but is so far inferior to that of acetylene as to leave it quite out of sight in comparison therewith.

During the past two years I have used acetylene exclusively for this work, with uniform success and satisfaction. The gas is furnished by a small portable generator, capable of supplying two burners, each of one foot capacity, for a period of ten hours. In practice, however, I use but one burner, ranging in size from one-eighth to one foot, as may be desirable, the most satisfactory all-round size being a one-half foot. The light is absolutely steady and *uniform*, with so high a degree of actinism, as to render shutter exposures necessary for many objects. with power up to one-half or four-tenths of an inch. The uniformity of the light is one of its most valuable features, as it never varies with any size of burner. *Semper idem*, leaving no room for guess-work as to length of exposures, it not only reduces these to a minimum, but insures a certainty of results unattainable by any other light I have ever worked with. The flame emits no perceptible heat or deleterious products of combustion, so that one may work a long time with it in a small room without experiencing any unpleasant effect. The generator can be manipulated

by any one quite as readily as a lamp, and the cost of maintenance is too trifling to require consideration.

Never having used either the electric arc or oxyhydrogen light in my own work, it is impossible for me to present any data of their values as illuminants in comparison with others familiar to me. But the following table, compiled from the results of many hundreds of exposures, may be relied upon, I think, as approximately correct in its comparative values of the sources of light named. Supposing the correct exposure with a given objective, and object illuminated by direct sunlight from a heliostat, to be one second, we have:—

Direct sunlight	1 second.
Acetylene, one-foot burner	3 seconds.
Diffused daylight, from mirror	12 ,,
Welsbach incandescent gaslight	24 ,,
Coal-oil or paraffin lamp	240 ,,

as about the required exposures to produce negatives of similar qualities in detail, density, &c. It would seem superfluous to say more regarding the pre-eminent value of acetylene in photo-micrography for making the negative.

Scarcely less valuable, however, is this remarkable light in another department of photo-micrography, that of printing, especially valuable to those whose work is mainly done at night. It is altogether too brilliant for use with the ordinary bromide papers, but a paper introduced during the past year under the name of Velox is not only exactly right as to sensitiveness, but produces the best prints of any that have ever come under my notice. It is a bromide of so slow an emulsion that it may be safely manipulated by ordinary lamp or gaslight, or in subdued daylight, but which, exposed behind a negative to a one-foot acetylene burner, at a distance of six or eight inches, will print in three to ten *seconds*, according to density of the negative. It may be developed with metol, amidol, ferrous oxalate, &c., in the full light of a lamp or gas flame, producing a print of the utmost brilliancy and permanence. It is furnished in both matt and glossy surfaces, the latter being preferable for photo-micrographs.

INDIAN WANTS.

By H. Manners.

P.O.P. and bromide papers are sent out by manufacturers conveniently cut up into sizes, which results in a very great saving of time and trouble. Why is not ready-sensitised albumenised paper done up in the same way? There are many photographers who still prefer the old silver print—I for one—and there would be a ready sale if this paper were sent out in cut sizes, especially among amateurs. No paper can yet beat albumen for simplicity of working, certainty, and variety of tone. Both plates and papers deteriorate very quickly in this country, in fact anywhere throughout the tropics, and ordinary consumers can never

depend on getting these fresh; the ordinary dealers take no special care of their stock, which consequently suffers from the heat and damp. What is wanted is that each packet of plates or paper should be plainly stamped on the outside with the date of its leaving the works of the maker. I wrote on this point to a dry-plate firm some time ago. They replied that every batch was marked with a distinctive number. That is so; but this number gives no information to the consumer, who is often sent packets of paper and plates which have been lying on the shelves of a dealer for a year or so. The results with these are naturally unsatisfactory, and the cause of much annoyance and disappointment to the user, not to mention the 'cusses' when he finds his negatives develop out with spots and dead patches. I personally have suffered greatly from this cause. A good fresh plate, in careful hands, will always yield a good negative, and fresh paper a good print; old and dead plates and paper will not, and the simple suggestion I have made would always enable a worker to know if the plates and paper he buys are reasonably fresh.

While on the subject of plates, can our clever chemists and scientists in photography not give us a plate (dry) that will develop with the old acid iron developer like the old wet plate? For dry plates developers are legion—good, bad, and indifferent. What we want is one like the old iron, that, with a suitable plate, will develop up quickly and clearly, and in which the progress can be plainly seen, as was the case with the wet plate. At present there is too much groping about at the bottom of a tray, and ever a delightful uncertainty. Surely science can help us in this matter; and I feel certain, were a reliable plate of the nature of the collodion wet plate put on the market, it would have an enormous sale.

Masks.—Why is it that there is so little variety in the sizes of the openings in these? In the quarter and half-plate sizes most of the ovals or other designs cut off far too much of the picture, especially in landscapes. What is wanted is designs only cutting off the margins of the plate where it rests in the rebate of the slide or sheath, say one-eighth or three-sixteenths, so as to leave in the print as much of the picture as possible. I have tried all over India to get masks only cutting off narrow margins, but without success, and I have had to cut them out myself, which is by no means easy to do cleanly and evenly. In the different art series of designs a great number of pretty designs might be added, say diamonds, stars, and different-shaped corners. Circles are often useful, but cannot be obtained except for lantern-slide masks; in fact, there are hundreds of designs that would greatly add to the turning out of pretty little snap-shot prints. The maker who will put on the market packets of, say, fifty designs, each design in threes, that is, with very narrow, medium, and wide margins, will soon find his sales increase. Discs are very rarely used.

Hand Cameras.—These are made in ever-increasing numbers yearly, but few makers go out of their way to meet the wants of photographers in tropical countries. The following are some of the wants. A good, simple hand camera, that will not swell in the damp weather or warp and crack in the heat. Is it not possible to make cameras of some material, like ebonite, which would stand the varying effects of different changes of climate such as we have out here? I had a hand camera that worked well all through the hot, dry season. I took it with me on a

sea trip during the monsoon, or rainy season, when the wood swelled up and plates jammed. The result was I did not get a single negative on my trip, which, I need hardly say, was a great disappointment, especially as I had taken with me a gross of quarter-plates, expecting to bring back a fine lot of good negatives. Talking of trips, let me advise all to develop their negatives as soon after exposure as possible, be they plates or films. In my experience those developed, say, within a day or so of exposure will generally yield nice bright negatives, whereas, if kept for a month or so before development, results in the negatives being flat and showing a want of brightness and crispness. Even on board ship development of small plates can easily be done in the cabin at night, with a small dark-room lamp, or two or three folds of Turkey red cloth round the electric-light globe will make a safe and pleasant light. Once the plates are developed they are all right, they can be stored away easily, and printed from at leisure with satisfactory results. If cameras must be made of wood, then they should be covered with some other material than the so-called morocco leather. Out here this covering seems to be greatly affected by damp; it gets all covered with mildew and discoloured, and it also rubs and peels off very easily. Some sort of waterproof covering should be made to supplant the leather. Another want for countries with very bright sunlight like India is an inner or safety shutter, between lens and plate, as well as the ordinary everset shutter in front or in slot. This safety shutter protects the sensitive plate from any pencil of light that may work in while the camera is being carried about, and can be pulled aside when a picture is about to be taken. Some cameras, the Facile, for instance, have this extra shutter, but in most of the hand cameras it is absent, and many are the plates spoiled by light creeping in through the lens and impinging on the plate. Another point is that every shutter made of metal should be of some metal that will neither rust, nor polish bright by the friction of its working. I know a brother photographer who last year got one of the most expensive hand cameras made. The shutter is of steel, and he has written me it is all rusted (I may say his work is chiefly at sea), and the result is that it constantly jambs; any attempt to clear away the rust only polishes the metal, and helps to let in light. This is a defect that camera-makers could easily remedy, but makers are very conservative. Their only idea seems to be that a camera suited for England is good for all parts of the world. The sooner this theory is put aside the better for all parties. Again, in most hand cameras it is almost impossible to get well and easily at both the lenses and shutters. Now, lenses out here, or on board ship, soon get covered with dust or fungus, and, if good work is to be done, need constant wiping. Makers generally advertise that lenses, &c., are getatable, but it is generally far from being the case. No doubt, by putting a bit of cloth on end of a penholder or bit of wood, the lens can be got at in some way; but this is not sufficient. What is wanted in all cameras is that the lens and shutter can be easily removed altogether, thoroughly cleaned, and replaced. A very slight arrangement would meet this want, and I draw makers' attention to it. Now, if I write any more, you will probably be more inclined to put it in your waste paper basket than in the pages of your ALMANAC, so I will conclude with the hope that makers will note our wants, and meet them to the best of their ability.

THE TESTING OF LENSES.

By A. Kapteyn.

In a short notice, early in the year, in The British Journal of Photography, you referred to some lens-testing arrangements which I have made for my own convenience. As I have received several inquiries about these arrangements, it might be desirable to give a somewhat more extended description of these arrangements in the Almanac. Of late years, all lens makers have given special attention to flatness of field and freedom from astigmatism, and the results they have obtained in that direction may well be called wonderful. The perfection of these latter-day productions is such that one is inclined to the belief that little is left to be desired, although, of course, the future may have things for us in store more wonderful still. However that may be, feeling personally interested in the good qualities of the various splendid lenses on the market, I arranged, for my own use, an appropriate test object, consisting of a flat vertical wall, fairly well and pretty uniformly illuminated.

This test surface is a square, 8 feet by 8 feet, and is covered by diagrams, concentric circles, fine line scales, wood engravings, printed matter, &c., and these various prints are so distributed that the four squares into which the main square is divided contain fairly symmetrical images. Each of these squares is photographed on a separate portion of

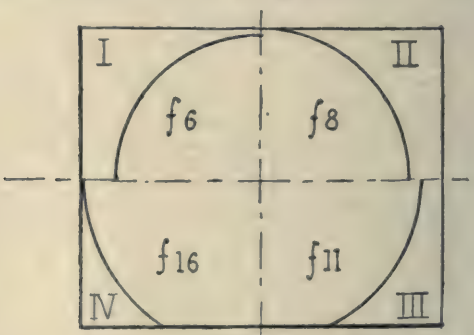


Fig 1.

the sensitive plate, and with a different stop, so as to have on one plate four different negatives relating to the same lens. This, of course, is a great convenience when examining the results.

When the test object is photographed, the image on the ground glass (if it be large enough) will give a certain size circle of illumination; and as the lens is of symmetrical construction with respect to its optical axis, a quarter of that circle will be as good as the whole of it for judging the covering power and other qualities of the lens.

It will thus become clear that if we expose the squares I., II., III.,

IV., of the plate separately, and with different stops, a pretty complete history of the lens will be obtained, and the influence of the stop used, and the corresponding covering power of the lens, can be studied with great ease.

The simplest way to expose the plate in four sections is to take a piece of blackened thin board, as shown in fig. 2, which exactly fits the frame against which the ground glass of the camera is hinged, leaving only a quarter, I., of the ground glass visible, and, if the plate is exposed, only that square I. will be impressed. By turning the wood round from

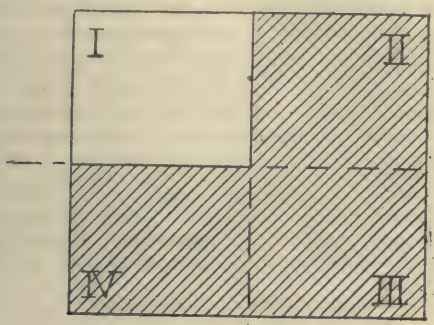


Fig 2.

right to left, square II. becomes visible. Then, by turning it upside down (top to bottom), square III., and finally, by turning it once more from right to left, square IV. will be exposed. If the camera has a reversing back, it is not neeessary to take the slide out between the various exposures. All one has to do is to shut the slide, detach the reversing back, and turn the piece of board the right way. The reversing back is replaced in position, the slide is drawn, another stop is inserted, and a fresh square is exposed.

To avoid confusion in judging several negatives and lenses, it is best to provide each square of the test screen with slips of paper, between which cards can be inserted, on which the name of the lens, its focal length, and the stop used, are inscribed with bold letters. In this way these particulars are photographed on to the plate, and the negative shows unmistakably to which lens and to which stop the square refers.

Now, as to the support of the camera, the two chief points to be remembered are:—1. That the sensitive plate must be accurately parallel to the test object, and perpendicular to the axis of the lens; 2. The optical axis of the lens must coincide with the line that joins the centre of the ground glass with the centre of the test screen.

To satisfy these two conditions with a camera on a tripod is practically out of the question, if time is a consideration. I therefore adopted the following arrangement. The test screen is a vertical end wall; the room is only nine feet wide and twenty feet long. The side walls of the

room are provided at the proper height with wooden rails, and these rails support a strong wooden bridge, of a T-square section, to give rigidity against flexion. It would be desirable to provide this bridge with four strong pinions, to run on racks placed on the wooden rails, to ensure parallelism of motion; but a good and cheap makeshift is to paste on the sides of both rails paper strips, with inches and their subdivisions, so that the front edge of this bridge can be placed at both ends equally distant from the test screen.

The bridge is now moved up to the test screen, and the camera so placed that the centre of the lens mount coincides with the centre of the test screen. It is necessary to ascertain with a level-square whether the front board of the camera is truly vertical. If not, the camera must be packed to make it so, and it is then firmly attached to the bridge by its centre screw and side stops. The next thing is to ascertain whether the ground glass is vertical, and the swing back may be used to make it so. Finally, it is important to see that the ground glass is parallel to the test screen, and for this purpose a long straight-edge may be used, and measurements taken to see whether its ends are equally distant from the test screen. A better plan, however, is to have a special straight-edge made with two legs accurately of the same length, and, by screwing the camera in or out, it can be seen to a nicety whether the ground glass is parallel to the screen.

The bridge is now moved away from the screen to such a distance that the ground glass just takes in the whole of the test screen. In testing lenses it is desirable to take a considerably larger plate than the size for which the lens is listed, because the performance of the lens outside that field settles the question as to how much use can be made of the rising front, &c.

To make sure of perfect register between focussing screen and plate, it is best to use only one side of the same dark slide, to remove the partitions in the slide, and to place the focussing screen in the very same place in which the plate is going to be exposed.

CELLULOID FILMS AND THE LATENT IMAGE.

By R. P. Drage.

In a former contribution to the Almanac respecting the destruction of the latent image in the case of celluloid films (cut sheets) which had not been developed for some considerable time after exposure, I pointed out that the emulsion itself had not appeared to have suffered in any way.

During the Jubilee festivities I was enabled to expose twenty-four films at the Naval Review, and a few days after, at the Review at Aldershot, I exposed about twelve dry plates. I placed them altogether, the films being laid on the top of the plates, in an ordinary cardboard plate box, without separate wrappings; round the outside of the box three coverings of brown paper were placed and tied round.

Work for the Great Yarmouth Convention prevented me for a considerable time from developing these exposures; but, when I came to operate with them, I found that neither on the films nor the dry plates could I get but only a trace of the expected image.

Talking over the matter with a well-known chemist and dry-plate maker, he informed me that the nitric acid employed in the manufacture of the celluloid would undoubtedly tend to completely destroy any latent image after a certain time had elapsed since exposure, so that in the above case the destruction of the latent image had been going on, in *both films and plates*, owing to the presence of the acid, ever since their exposure in the camera, the emulsion itself on both films and plates seeming to keep thoroughly good.

Of course, a plate always seems a little more convenient for development than a film, but, given the same emulsion on films as on plates (and we certainly are favoured in these days with most magnificent material by our plate-makers, even to the issue of ready-backed plates), the trials of travellers and tourists are considerably reduced, twelve dozen films weighing very little more than one dozen glass plates, besides the immunity from breakage. At the same time, if we could only persuade the makers to dispense with the use of that destructive acid in the manufacture of the celluloid, another trouble would be removed, as, in my opinion, with the present mode of manufacture of the celluloid, a fortnight at the outside should only elapse after exposure to get good results when developing cut films.

My remarks do not in any way apply to the rollable film, the manufacture of which is totally different, but to the films as they are sold in packets of cut sizes for use in our dark slides and changing boxes in the same way as dry plates, and the use of which is increasing to an enormous extent with tourists and travellers who are also photographers.

A RETROSPECT.

By E. W. Foxlee.

The historical photographic Exhibition, held at the Crystal Palace during the past summer, served as an admirable object-lesson to illustrate the progress of photography during the fifty-eight years of its existence, from 1839. It served also as an object lesson to show how little advancement, so far as actual inventions and results are concerned, has been made during the latter half of that period as compared with what was done in the first half of it. Some modern workers seem to be under the impression that nothing really good was done prior to the introduction of gelatine photography, or, as it is generally expressed, 'dry plates;' but the things shown at the Crystal Palace ought to have quite dispelled that idea.

As to dry plates, there were several processes by which they were made that yielded results quite equal, if not even superior, to those on gelatine plates. It must be admitted, however, they were not so sensitive. For example, there were in the Exhibition some albumen negatives, as well as transparencies from them, taken in the early 'fifties,' that I unhesitatingly say cannot be equalled, for fineness of detail and general excellence, by any gelatine plates. There were examples of dry-collodion plates; one frame of 12 × 10 prints from negatives made in 1854–5, which will hold their own against any modern negatives of the same well-known subjects—views on the Thames. Some pictures by the collodio-

albumen process, and by the gum-gallic process, taken by an amateur in the 'sixties,' cannot be beaten by gelatine.

As a rule, larger sizes were worked by amateurs in the early days than is the case now. There were in the Exhibition examples by an amateur of 24 × 18 pictures, taken direct in the field, on dry plates (collodio-bromide) of his own preparation thirty years ago, that it would be impossible to beat now on gelatine plates. The prints were made at about the time the negatives were taken on albumen paper, and they showed no sign of fading. Examples there were of paper negatives, and prints from them, that were taken in the 'forties' and 'fifties,' that were quite as good as modern paper negatives. A series of the interior of the '51' Exhibition—there is no doubt as to the date of them—are as free, if not freer, from granularity than those on modern gelatine paper negatives. At the time these pictures were taken there were no anastigmat, or even rectilinear lenses, yet some Daguerreotypes of the interior of that building show no distortion, or curvature, of the columns at the margins of the pictures.

As to instantaneous photography, there was a Daguerreotype of New York Harbour, taken in the early 'fifties,' that was in every way as sharp as if it had been taken on a modern gelatine plate. Instantaneous street scenes—London and Paris—published some thirty years ago, taken by the wet-collodion process were equally as sharp as any taken since on gelatine plates.

Take again the carbon process. There were some pictures by that process exhibited, which were made more than thirty years ago, the excellence of which could not be surpassed at the present time. Another permanent process—platinum—we have had nearly a quarter of a century. Film photography again, rollable film, and roller slides for using them, were made, commercially, quite in the early 'seventies,' and results upon them, equal to those on present-day films, were shown in the Crystal Palace shows. Thirty and more years ago enlargements were made, commercially, direct from the negative on silver paper—'iodised paper'—both by electric and by limelight, and they were equal, if not superior, to most now done on gelatine paper.

In the matter of permanence in silver printing have we advanced, or have we not rather retrograded? At present some consider that if a print lasts for four or five years—and many don't—that is all that can be expected; but in the Exhibition there was a silver print made in 1839, and several others, on plain paper, made in the 'forties,' that were quite unchanged. So were some albumen prints forty or more years old. The collodio-chloride process, which is being more used now than hitherto, dates from 1865, and some pictures were exhibited that were made by it twenty-six years ago, which showed no sign of deterioration. By the way, these were on paper 'made in Germany,' as until recently that country was the only source of supply of the paper. Examples of the 'blue process,' now so much used by architects and others, were in the Exhibition, that were produced some forty years ago, that had undergone no change.

As regards the photo-mechanical processes, they have advanced *very* greatly during the last few years; yet, in the Exhibition, there were examples of 'process' block prints, photogravure, as well as photo-lithos in half-tone (1859–60), which would compare very favourably with *some*

of the commercial work that is turned out now. The collotype process is nearly thirty years old, and some of the work done by it more than a quarter of a century ago is certainly superior to much that is produced now. Ceramic photography is very old, and an example shown, dated 1862, was quite equal to any modern work.

Although photography has made great progress during the last quarter of a century, it is difficult to see what is done now that was not accomplished prior to that period. It was done, it is true, under greater difficulties than exist now, but still it was done, and done well too. The principal advancement in photography during the past five-and-twenty years seems to be more in the direction of increased applications and greater facilities in working—thus lightening the burden of the worker—rather than in new inventions or general superiority of results.

A HELP IN THE STUDIO.

By Henry Erle Cooper.

Although for many years past lens-makers have been aware of the advantages of shielding the lens from all unnecessary light, and photographers themselves have had some knowledge of the benefits resulting from so doing, it is extremely doubtful whether this knowledge has been applied to the extent it ought to have been.

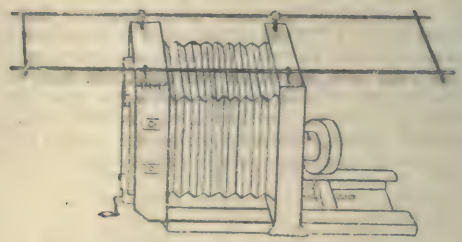
It is a fact, well known to artists and others, that, by shutting out all unused light from a picture or scene, the brilliancy of that object is materially increased. Thus it is that, when the most striking effect is desired on a certain painting or view, the best result is obtained by looking through a tunnel arrangement, the effect of which is to increase the brilliancy until a picture sometimes appears almost stereoscopic.

What I have said regarding the viewing of pictures and scenes applies equally to photographing the same, and it is somewhat surprising that the importance of the subject has not been observed before.

Lens-makers, I know, practically all manufacture their lenses with projecting hoods on the front, and, although it is an undoubted advantage, it still leaves room for considerably more improvement in the same direction. Sometimes a cone or tube of either tin or cardboard is attached to the front of the lens with a view to shut out rays of side light. Such a plan, whilst, no doubt, effective, is both unsightly and obtrusive, and is in no way equal to the arrangement which I am about to advocate—an arrangement which effectually shuts out all side light from striking into the lens, keeps the camera and lens protected from dust and injury, covers the dark slide from light, and allows the operator to focus in comfort and with ease.

A framework is first made of brass tubing, or rods about three-eighths of an inch in diameter; the length should be between three and four feet, while the width will be decided by the measurement across the top of the camera, the two end or cross pieces can, if desired, be made of mahogany, which can be fitted more easily. The framework is now secured on to the top of the camera by four brass or steel screw eyes, the holes of which are slightly larger in diameter than the brass rods;

these eyes are screwed, one at each corner, the proper width apart on the top of the camera, so that the framework travels backwards and forwards through the eyes easily and smoothly, which it should do if properly made. The focussing cloth, which should be of ample dimensions, is placed on it, extending from the front and hanging over the back so as



to shield the screen. When about to use the camera, the framework is drawn back, and allows the focussing to be done in ease and comfort. When ready to expose, it should be pushed forward its entire length, and thus forms a most excellent shield to the lens.

The photographer who has never tried the effect of shielding his lens will probably be surprised by the increased brilliancy that he gains by so doing; whilst, if he adopts the arrangement I have advocated, he will find that it adds materially, not only to the result, but also to the ease and comfort of studio working.

Although there may be no novelty in the above—which I have seen worked in other studios besides our own—I believe it to be a matter much neglected by many professionals.

CATALOGUING AN EXHIBITION.

By R. Child Bayley.

Photographic exhibitions are so common nowadays that the Secretary of a Society may almost at any time find himself engaged in organizing one, and, if he has no experience to fall back upon, will probably do many things in a roundabout manner which, with the knowledge gained by having gone through the same performance before, would be done as well with perhaps half the trouble. Making the catalogue is a case in point.

There are two ways of issuing a catalogue. In one each exhibitor's work is listed together, irrespective of the position of the various frames on the wall. From the Secretary's point of view, this is the simpler; from the visitor's, the more exasperating, since the latter wanders round and round the Exhibition to find No. 13 (Mr. Smith's portrait of himself) or No. 272 (A Study, by Miss Brown), without the clue yielded by the regular sequence of the numbers on the frames. No. 13 may be between No. 2 and No. 200, while Nos. 1, 2, 3, and 4 may be on four different

walls. This is how it should not be done then, and need not be further discussed.

The better plan is to have the numbers on the frames running consecutively through the Exhibition, so that No. 2 is next No. 1, No. 3 next No. 2, and so on. The reason why this system is sometimes shirked is to be found in the belief that, in consequence of the catalogue order depending upon the hanging, the actual work on the catalogue cannot be commenced before the hanging is over. This is not the case in practice, if the method adopted at the Royal Photographic Society's Exhibitions and, doubtless, at many others, be adopted.

On each entry form are two columns, headed, 'For office use.' One would think this heading would be understood by every exhibitor as not referring in any way to him, and yet the writer has had would-be exhibitors writing to inquire how those columns should be filled up. This, however, is by the way. Each frame, as it is received or unpacked, is given a number, its office number, which number is filled in in the first column of the entry form of the particular frame numbered, and serves to describe the print until the hanging is over. An adhesive number label is stuck on the glass to correspond, and the paper on which such number is printed should be distinctive in colour from that of the label finally employed.

Sheets of foolscap are ruled as below beforehand :—

	Office No.	Catalogue No.	Catalogue No.	Title.	Exhibitor.
	1				
	2				
	3				
A	B	C	D	E	F

As soon as the preliminary numbering is done, the entering up on these sheets may begin. A is used simply to join the sheets together into a book form. The office numbers are already filled in consecutively in column B, and the title and exhibitor's name is written out in columns E and F. Nothing more need be done until the hanging is over, when the prints are numbered consecutively as they hang on the walls, whoever does so making out a list of the office numbers and putting against each its final or catalogue number. The catalogue numbers are then entered up, off these lists, into columns C and D, twice over, it will be noticed. When this has been done, the foolscap sheets are cut through between columns C and D, as shown by the double lines, and then, with a sharp knife and a straight-edge, the sheets are cut up in the other direction into a series of slips, each bearing the catalogue number, title, and exhibitor's name of one frame. These are sorted out into numerical order, stuck on to sheets in that order, and form the copy, which can be sent straight away to the printers. The columns A, B, and C, which are not so divided, form a kind of reference book, which will enable the original or office number of any

frame to be easily ascertained. From this the entry forms, which have been kept in the order of the office numbers, may have their second column filled in with the catalogue numbers. The forms are then arranged in the alphabetical order of the exhibitor's names, and the compiling of an alphabetical list of exhibitors, each with the number of their exhibits attached, becomes very simple.

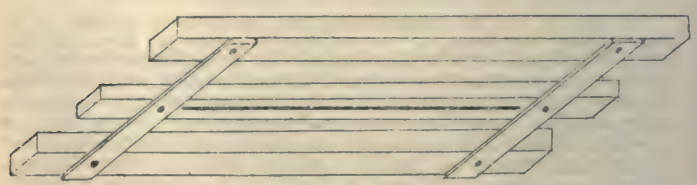
By acting in this way, it is quite easy to have the copy for a catalogue of 300 or 400 exhibits ready for the printers in an hour or two after the hanging is completed. Mistakes do not often occur, there is no need to look on the back of the frames for the exhibitor's name or the title of the exhibit, and the loose hanging label, never very satisfactory, is done away with. The system is simpler in practice than it appears on paper, and will be found a labour-saving device at a time when to most Hon. Secretaries such is most valuable.

This slip system is very useful in other ways. In cataloguing libraries it is convenient, and in making indexes and alphabetical lists of members it will save much time. If 100 names are wanted arranged in alphabetical order, it will be found quicker to write them out roughly on slips, cut them up, and arrange them in the required order, and then to fair-copy them out, than to attempt to pick them out one at a time in drawing up the list. In such a case as I have mentioned, the saving of time alone amounts to something like fifty per cent., and the liability to error is also much reduced.

HANDY PLATE-CUTTING APPLIANCE.

By W. P. Wiseman.

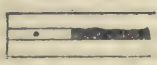
Now that there are so many small cameras in the market, taking the halves or quarters of standard sizes, a simple appliance for cutting up plates may prove of interest. In a general way, only a very few brands can be obtained ready cut to these small sizes, and the chances are that our own pet plate is not among them. A fixed guide, arranged to cut



to a definite size, has one disadvantage, if the plate being operated upon is not of the full standard size, whatever error there may be is all cast on one half. Thus, if we are dividing a half-plate longitudinally with a fixed guide set to cut two and three-eight inches, if the plate happens to be only, say, four and five-eighth inches wide, we shall have the one side two and three-eighths and the other only two and a quarter inches wide. This may possibly mean that our little plate will drop through

the carrier, for the rebates cannot well be very wide in these small sizes. If we could divide our plate *exactly in half*, whatever its size, this risk is reduced to a minimum. This object is attained by the use of the following appliance: First construct a magnified parallel rule of the ordinary mathematical-instrument pattern, *i.e.*, two flat rulers connected by a couple of crossbars; exactly midway in these crossbars drill a hole and pivot thereto a third ruler, somewhat less in thickness than the other two, so that, when they are resting on a flat surface, it may be raised about one-sixteenth of an inch. This third limb is slotted, almost from end to end, exactly in line with the pivots, the slot being of such size as to allow a diamond or wheel-cutter to slide along easily, but without side shake. If the affair has been carefully made, we may place a plate, of any size within its capacity, between the outside rulers, and, when they have been closed to grip it closely, the glass-cutter, on being drawn down the slot, will divide the plate exactly.

The rough sketch accompanying explains the principle. One of the rulers may be fixed, and in many respects is preferably so. The central limb is most readily made by being built up as it were, the plan of one end appearing thus :—



the black part being the slot. I have given no dimensions, as they wil depend on the largest size of plate intended to be cut. For cutting up to half-plate, a suitable size would be about eighteen inches long for the rulers and nine inches for the cross-bars.

ON THE PERMANENCE OF VARNISHED NEGATIVES.

By Matthew Wilson.

The recent examination of a series of dry-plate negatives, taken by myself about fifteen or sixteen years ago, has led me to form somewhat unfavourable conclusions as to the action of photographic varnish upon a gelatine film.

Of the plates in question about one-half had been varnished, these being chiefly portrait negatives from which a large number of prints were required. The unvarnished remainder, consisting mainly of half-plate landscapes, had been treated, in regard to development, fixing, and washing, in precisely the same way as their varnished companions; and it is well that I should add that, except in two or three cases, one brand of plate had been adhered to from first to last.

Subsequently, silver prints of the entire series were repeatedly taken on albumenised and other papers, quite as many being printed off of the members of the landscape or unvarnished group as of the portrait or varnished.

It only remains to be added that the varnish that I employed was

prepared by a well-known firm of photographic chemists. It was one specially intended for dry-plate negatives, and I found it to be pure and of excellent quality.

I mention the various preliminaries thus in detail, because they serve to throw light upon effects the causes of which it might otherwise be difficult exactly to trace.

These effects, which are confined solely to the negatives that received the varnish coating, consist of a general darkening or increase in density of the image. In some cases this defect is noticeable only by a yellowish tint, so pale as scarcely to impair the brilliancy of the high lights; in others it is so pronounced as to amount to absolute opacity. It is generally most marked about the centre of the negative, but it is seldom that it makes its appearance, either there or elsewhere, without imparting a proportionate increase in density to the image taken as a whole.

This phenomenon is to be attributed to a combination of circumstances, partly physical and partly chemical. Practically the operative causes are two in number—firstly, imperfect washing; and, secondly, the employment of varnish. In addition to these, theory recognises the existence of a third cause, and that a very important one, namely, the porosity of the gelatine film. I will take the last-named first, in order to make my meaning clearer.

If we take an imperfectly washed negative after drying, and examine the surface of the film through a magnifying glass, we shall find it coated with a thin white layer of very minute thiosulphate crystals. These crystals have been expelled from the pores of the gelatine during the process of drying. In some cases the deposit is visible to the naked eye; in others, even the lens will hardly reveal its presence.

Reasoning by analogy, we shall be justified in concluding that the expulsive function of the colloid body will maintain itself under the various conditions of washing which we can produce, and we shall accordingly expect that whatever portion of saline residue a film may retain after washing will ultimately find its way, either to the pores in the immediate neighbourhood of the surface, or to the surface itself. This porosity of the film has, we see, then, a powerful influence in maintaining the stability of the image against the attacks of the destructive agencies attendant on perfunctory washing, an influence of no small moment to the photographer, seeing that, so far as dry plates are concerned, perfunctory washing is one of the crying evils of the day.

Now, bearing in mind the facts that have just been stated, it is easy to see that the application of varnish to a dry-plate negative (save in the few cases where it is possible to establish the certainty of the elimination of the thiosulphate), though a thing legitimate enough in itself, is none the less likely to endanger the permanence of the image, for we must not forget that, just as the film was porous to the thiosulphate solution, so will it be to the varnish, the only difference being that, in the former case, the action was outwards towards the surface, whilst in the latter it is from the surface inwards.

Now, in actual practice, what seems to happen is this, the warm varnish, in permeating the the film, carries down with it into the body of the image the crystalline deposit which has formed on the surface of the plate during the process of drying. It is now, so to speak, locked into

the film and under the new conditions thus brought about the silver of the image is partly converted into sulphide, &c., and the result is the gradual destruction of the negative.

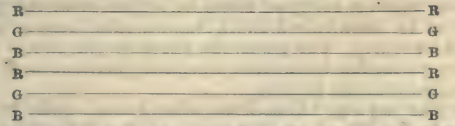
Two remedies suggest themselves for this state of things. The first is to varnish no plate that has not received a washing sufficient to destroy all traces of sulphur salts. The second, which personally I am inclined to prefer, is to wash well, dry, and print without varnishing at all. With ordinary care there is absolutely no need for a varnish coating in the case of the average dry plate, even although many prints should be required from the negative. In this matter, however, as in many others, we must expect to find differences of opinion. What is of real moment is that the photographer should always bear in mind that, in every case in which varnish is to be applied, the washing of the plate must be of the most thorough character.

McDONOUGH (JOLY) PROCESS OF COLOUR PHOTOGRAPHY.

By Milton B. Punnett.

This article has been written, not with the intention of discussing the respective claims of the late Mr. James McDonough, of Chicago, and Dr. Joly, of Dublin, as to whom belongs the honour of discovery of this method of reproducing, or attempting to reproduce, the colours of nature by the aid of photography, but with the idea of giving a brief outline of the process, together with a short criticism of the same.

Through the kindness of the late Mr. McDonough, who was a genial whole-souled man, possessed of large inventive faculties, the writer had the pleasure of examining some beautiful specimens of his method. The screen used was a mica plate, ruled with alternate lines of red, green, and blue.



These lines were about one two-hundredth of an inch in width, and were in *intimate contact* with each other. The colours were not visible to the naked eye, the screen appearing of a greyish tinge.

Under a powerful magnifying glass the bright coloured lines could be plainly seen.

This screen was mounted on a glass plate.

As a simple subject to photograph, let us take a red letter, 'R,' a green letter, 'G,' a blue letter, 'B,' a letter 'M,' whose colour is composed of a mixture of any two of the above colours—say, red and blue—and a white letter 'W,' which, of course, would contain the three colours mentioned above—

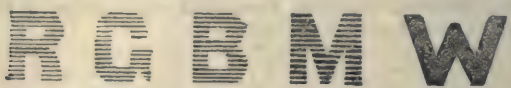
R, G, B, M, W.

As the best orthochromatic plates are much more sensitive to the blue-violet and ultra-violet than to the red, yellow, and green, an auxiliary

screen, to cut off the ultra-violet, which affects the plate and not the eye, and to reduce the blue and violet, will be necessary. This screen is not ruled, and is similar to those ordinarily used in orthochromatic photography, and, in this instance, will be placed between the lenses.

Our line screen is placed with the ruled side in contact with the film side of the plate, and a somewhat prolonged exposure, due to the light-absorbing power of the two screens, is given, and the plate developed and fixed as usual.

Upon examination we find the images of the letters in our negative are made up of line, with the exception of that of the letter w, which is solid. If we now place the screen on the negative in exactly the same position that it occupied when the exposure was made, we find that the



black lines of the R coincide with the red lines of the screen, those of the G with the green lines, and so on for each letter, while the black of the W coincides with all the lines. The reason for this is obvious. Each line of the screen has transmitted its individual colour and absorbed the other colours. The black lines of the negative coinciding with the lines of the screen which have transmitted the colours, we see the images not in the actual colour or colours of the subject, but in the colour, or combination of the colours, of the lines which, in the exposure, protected the plate from the action of the actual colour or colours.

This difficulty is easily overcome by making a positive by contact from the negative, in which positive the opaque black lines of the negative will be transparent, and *vice versâ*. Placing the screen in contact with this positive in the same relative position with regard to the coloured lines which it occupied when in contact with the negative, and viewing them by transmitted light, we see the images in the actual colours of the subject. The purer the white of the image of the letter W, the nearer perfection have been the manipulations and all the conditions entering into the process.

The German saying, '*Kein Preis ohne Fleiss*,' finds one of its best illustrations in the life of an inventor, and the difficulties which have been, or will have to be, overcome in this process are many. In the very short experience the writer had with the subject, it appeared to him that the success of the process depended, in the first place, on a harmonious relation between the light-absorbing power and quality of the auxiliary screen of the line screen and the orthochromatic properties of the plate. This, of course, also includes the proper selection of the colours of the line screen, their depth and relation to each other.

In the next place, the lines of the screen must be very fine and accurately ruled in intimate contact. Say a screen is ruled 200 lines to the inch, then the image of an object reflecting a preponderance of one primary colour would consist principally of the light transmitted by every third coloured line, be it red, green, or blue, and these lines, of course, would be one one-hundredth of an inch apart. This distance is

visible to the naked eye under these conditions. Therefore the finer the lines the better, but an increase in fineness also increases the difficulties of accuracy and uniformity in ruling. Especially are accuracy and uniformity necessary when a different screen is used in viewing the positive to what is used in taking the negative.

Even if the same screen is used for taking and viewing, it must be uniform throughout, as the rights and lefts of the negative are reversed in the positive, and the screen cannot possibly occupy the same position with regard to either right and left or top and bottom that it did on the negative.

As the coloured lines are all of equal width, the right coloured lines must be brought into register with the transparent (or semi-transparent) lines of the positive, otherwise a false colour-rendering will be the result. If the lines of the positive and those of the screen make the slightest angle with each other, rows of miniature spectrums appear.

If the subject contains parallel lines of a certain distance apart, and



these lines make an angle with the lines of the screen, the result will be a minute grating-like appearance in the picture.

The lines of a brick building standing on a lower plane than the camera causes such a disfiguration. I hope my enumerations of these difficulties will not be taken as an adverse criticism, as they are not so intended. The results in general obtained by Mr. McDonough were very beautiful. An autumn landscape, and such a landscape as only an American autumn can paint—hazy atmosphere, bright-coloured leaves, ready to join their comrades drifting below—all faithfully pictured, emphasise the superiority of this method of representing nature over the usual monotone reproductions.

It is a pleasure to add that Mr. Flora, the able assistant of Mr. McDonough, continues the work of his departed friend.

LENSES FOR ARCHITECTURAL SUBJECTS.

By C. H. Bothamley.

Much has been said and written about the exaggerated perspective shown by photographs taken with wide-angle lenses, that is, lenses which have a short focal length as compared with the dimensions of the plate used. No doubt there is a great deal in some of the objections that have been urged, and, if such lenses are used unskilfully or if they are of extremely short focus, the resulting pictures are, most certainly very unsatisfactory. I am free to admit also that, within certain limits, it is an excellent rule to make use of a lens of as great a focal length as possible. At the same time I do not admit that any definite rule can be laid down except in a more or less conventional and arbitrary way. We are told that, if a lens is used which has a focal length shorter than the diagonal of the plate, the perspective will be exaggerated, but a very little con-

sideration will show that there is nothing very definite about this rule, for, if the focal length of the lens is the same as the diagonal of the plate, the 'angle of view' included will really vary with any variations in the ratio of the length of the plate to its breadth. Further, What is exaggerated perspective? It is quite certain that many drawings by artists of good repute show a perspective that is at least as 'exaggerated' as that of pictures taken with what are generally regarded as wide-angle lenses. It appears to be often forgotten that a scientifically correct perspective drawing is only visually correct when looked at from a particular point; from all other points it is incorrect.

Now, with no class of subjects is a photographer *compelled* to use short-focus lenses so much as with architecture; and, as I exposed during the summer more than 300 plates on architectural subjects, it seemed to be a matter of some interest to ascertain what lenses had been most frequently used, it being understood that it is my custom to use always the longest-focus lens that will give the desired quantity of subject.

Some of the plates were whole-plates, some were quarter-plates. It was found that, in the case of 102 whole-plates for which the exposure data had been recorded, 40 were done with a 6-inch lens, 59 with a 9-inch lens, and 3 with a 12-inch lens. In the case of 206 quarter-plates, 160 were done with a lens of about $3\frac{3}{4}$ inches focal length, and 46 with a $5\frac{1}{2}$-inch lens. So far as I am able to judge very few of the resulting photographs show any marked exaggeration of the perspective.

Now, very few of the subjects were in streets, and the proportion of interiors was not high, and consequently the conditions as a whole were favourable to the use of fairly long-focus lenses. It will be seen, however, that the cases in which it was found practicable to use a lens with a focal length equal to the diagonal of the plate were comparatively few. It is also a fair deduction, since the subjects taken were very varied and very fairly typical of architectural work, that, if for any reason a photographer going in for architectural subjects is obliged to restrict himself to one lens, he will be able to deal satisfactorily with the largest number of subjects if his lens has a focal length about equal to the length of the longest side of the plate. With proper skill in selecting the point of view, the 'exaggeration of the perspective,' if it exists at all, will be slight. But this is merely a practical suggestion; it is neither a rule nor a law.

ZINC DISHES FOR BROMIDE ENLARGING

By W. G. Stretton (Rangoon).

I constantly see complaints in the photographic journals about the wooden dishes with glass bottoms so generally used leaking, with inquiries as to the best way of making them watertight.

Why use such dishes? They are not only expensive (for you want several sets), but are unhandy and easily broken. Zinc dishes will answer every purpose. It is as well to have a set of three for each size of paper that you work, otherwise there will be a needless waste of developer, using a 15×10 dish, for instance, for a 12×10 print. One will be for developing, one for clean water for placing the prints into as they are developed, and one for the hypo.

A separate dish is not required for the clearing bath, since when the print is sufficiently developed the developer is thrown away, and the clearing solution poured on. They should be made of stout zinc, and bound round the edges with stout wire, gently sloping slides, that they may pack inside one another, and fitted with a round knob about half an inch high at each corner to keep them clear of any wet on the table. I have three sets, whole plate, 12×10 and 15×12; they are one and half inches deep, and half an inch larger each way than the paper they have to take.

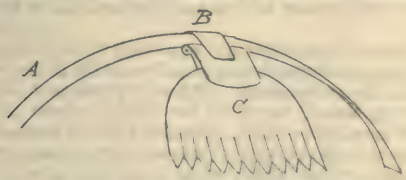
They are painted with oxide of iron outside, and burnished inside with copal varnish, but probably any good enamel paint would do as well. These dishes were made at Calcutta in the bazaar by a native five years ago, and are as good now as when I first had them. Twice a year I thoroughly clean, paint, and varnish them, so that they are always in good order, and never give any trouble.

Remember that hypo and zinc don't agree together, so the hypo dish had better be painted both inside and out with a distinctive colour, varnished inside as well.

A USEFUL SKY-STOP.

By J. A. C. Murray.

A great many good photographs are spoiled owing to the sky getting over-exposed before the rest of the picture is done. This can, in a great measure, be overcome by using a sky-stop, which will cut off a portion of the light. I lately contrived a modification of the old hinged-flap form that will fit several of my lenses of various sizes. The flap being made



of thin zinc, lead, or even stout brown paper, and having its lower edge serrated, it can be made to take an approximate outline of the sky-line, and, raised or lowered by means of the hinge, to cut off the required amount of sky-light.

Although a very old-fashioned contrivance, I think it will amply repay the trouble of using it, by the superior rendering of cloud effects and the reduction of halation where trees, &c., come against the sky.

The hinge is formed of thin sheet brass, one of its wings being made to fold round a piece of strong watchspring, the other one being left open to receive the zinc or paper flap. When in use, the spring is simply coiled and slipped into the hood or front of the lens, where it will remain firmly fixed, and the flap is then adjusted as required.

ALUM.

By S. E. Kelf.

Hardwich's *Photographic Chemistry*, a standard work in bygone days, consisting of 600 pages of closely printed matter, dealing exhaustively with the subject, has not the word 'alum,' as far as I can trace, in the book. The particular copy to which I am referring is of the seventh edition, and over thirty years old. At the present time you can scarcely take up any publication dealing with photography, from Captain Abney's treatises down to the useful leaves called 'Scraps,' but that you will find alum described, discussed, or recommended in some way or other. Even in developing directions alum is invariably mentioned;—mostly on the plate boxes. I suppose the reason of its absence from older instructions was that in the days of collodion plates and albumen paper alum was not necessary. Some never seem so happy, when practising photography, unless they use nearly every chemical that can be squeezed in the instructions, while the more sensible hold that the less you can do with, or the simpler you can get a reliable result—the better. It is an accepted fact that the frilling of dry plates is caused by the gelatine absorbing much water and expanding, and that, if alum be used, hardening of the film sets in, and so counteracts the frilling. Alum also acts somewhat analogous to acids, by clearing films from developing stains, while it has also been averred that alum is good as a hypo eliminator; but, if the plates are made of hard gelatine, and with the precaution of not being allowed to remain an inordinate time in the developer, or allowed to soak in water; or again, if the plates are free from stains, alum is quite unnecessary unless the weather be hot. Better, however, to get the solutions cooler, as every manipulation, by putting in chemicals and then washing them out again, gives tender films a much better chance of reaching the waste box.

The use of alum in photography is, of course, well known, yet there is much to learn by photographers generally in its action when coming into contact with other chemicals. Potassic alum and ammonia alum are freely soluble in water; but it is not widely known that, where the alum salts are in extremely dilute solutions, that is, a small amount of alum to a relatively large amount of water, a white precipitate is thrown down of aluminium oxide, which is an insoluble compound. This is a peculiar characteristic of alum, and is often mistaken by photographers for chloride of silver by the milkiness of the washings. An experiment on this can be made by putting in a tumbler of clean water a speck of alum about the size of a pin's head, and leaving it for several hours, when a relatively large quantity of a white gelatinous-looking substance will cover the bottom of the glass. From this we can infer that, even the slightest trace of alum left in prints or on plates, a deposit of aluminium oxide will be present and cause a white-looking deposit, even if undiscernible at a casual glance; but in the case of alum coming into contact with hypo the effect must be more pronounced. Sometimes, while in a room where a large quantity of toning, aluming, and fixing has been going on, I have noticed a smell resembling very much the odour of rotten eggs. I have felt sure it was H_2S (sulpburetted hydrogen). So with three samples of common alums—potassic, ammonia, and chrome—I made up solutions of each. Into the same I poured some hypo

solution and then corked. In a short time as fine a sample of sulphuretted hydrogen came off as one could wish, and, if left for some days, a deposit of sulphur will form on the sides of the test tube.

Any one studying the composition of alum, which is in the case of potassic alum—

$$\left.\begin{matrix} SO_2\,Ko \\ SO_2 \\ SO_2 \\ SO_2\,Ko \end{matrix}\right\} {}^{1}Al_2^{III}\,O_6^{VI};\ 24\,H_2O$$

and hyposulphite of soda ($Na_2S_2O_3+5H_2O$), and seeing that 'hypo' is prepared by passing a current of sulphur dioxide into a mixed solution of sodium sulphide and caustic soda, and purifying by crystallisation, it will be seen that sulphuretted hydrogen can be obtained. It must be obvious that, the more the alum and hypo can be kept apart, or effectually got rid of, the better for the prints and plates, and, unless mechanical injury is feared, alum ought not to be so profusely used. Hypo alum toning baths for bromide paper are one of the latest recommendations. It may be all right for present brilliancy, but I should fear gradual evanescence of the image, or the very reverse of a permanent print.

RECENT IMPROVEMENTS IN FINDERS FOR THE HAND CAMERA.

By Dr. A. Clifford Mercer.

Amateur photographers everywhere are familiar with the common form of finder. An image projected upon a bit of ground glass set in the top of a hand camera is a faint and troublesome indication of what one may capture by a snapshot.

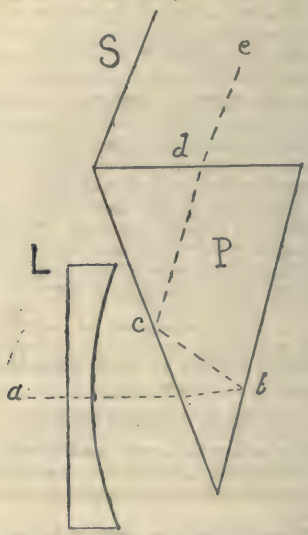
The English 'brilliant' finder is a small rectangular telescope, having an object lens directed forward toward the view, and an eye lens directed upward toward the observer. A mirror between the lenses changes the direction of the rays of light from horizontal to vertical. The front lens projects an aërial image within the finder. This aërial image, seen through the top lens, is bright enough to be distinct in sunshine without shading the finder with a hand or a hood. The brilliant type of finder is remarkably superior to the common form. It has had unstinted and merited praise from the photographic press of England.

That the American iconoscope (image viewer) is worthy its distinctive name is conceded by those who become acquainted with its image, and at the same time note the optical principles utilised in the exquisite little instrument.

The iconoscope has all the brilliancy of the recent English finder. In addition, however, it is superior in several respects. The image of the iconoscope is not reversed from right to left. The user of the iconoscope sees the image at a convenient obliquity, scarcely bowing at all. The eyes glance from the view to its image, and from the image to the view, without moving the head. The upper surface of the top lens in the English finder reflects, as a mirror, images of the observer's face and surrounding objects. These reflections, to some extent, confuse the image seen in the finder. Such reflections are not seen on looking into the

iconoscope, only a beautifully clear image of the view to be photographed. The definition of the iconoscope is not inferior to the definition of a first-class lens.

The iconoscope, seen in section in fig. 1, consists of a negative lens, L, a prism, P, and a black screen, S. The broken line, *a*, *b*, *c*, *d*, and *e* is the path of a ray of light from an object through the finder to the



eye of the observer. The surface, *b*, is silvered. At *c* the light suffers total reflection. At *d* it is refracted. The image is seen in the direction, *e*, *d*. The screen prevents confusing reflections at the top surface of the prism.

The quality of glass and the workmanship necessary for a good prism make the production of the iconoscope somewhat costly. The cost, however, is not so great as to place the iconoscope beyond the reach of many amateurs who admire and require perfect instruments.

A CHEAP BACKGROUND.

By J. H. Wileman.

A short time ago, requiring a plain background for a picture, and not having a suitable one handy, it struck me that a satisfactory article could be made, at a slight cost, by the following means. As colouring is not my strong point, it seems to me that, as it was successful in my case, it would be doubly so in that of any one who was used to painting or artistic work of that kind.

Take a piece of unbleached calico or other suitable material, of the size required for the background, and stretch it on a frame or other convenient support by means of some tacks. Now take a sponge and wet the material evenly all over; while this is soaking in, take a cake of Maypole soap, of a tint to suit purpose ('nut brown' gave me the required tint), and divide it into two equal portions. Mix one-half according to directions supplied with each cake, but make the solution much more dilute; take the sponge and go carefully over the calico with the solution until it is of a uniform tint, taking care that all sharp outlines are softened as you go on. With a little practice this will very easily be done. Allow this to soak in (but not to dry), and, while it is doing so, take the remaining piece of soap and make with it a *strong* solution, as directed. Dip the sponge in this and proceed to dab the portion of background required darker than the main portion, graduating it off at the edge of the darker shade, and merging it into the lighter; do this carefully, and it will be found that a splendid graduated background is the result, equal in usefulness to one costing as many shillings as this does pence. Should it be desired to alter the tint at any time, another tint may be superimposed, full details being given with each cake of soap of the effect of one shade on another. The sponge used will naturally be dyed, but otherwise none the worse. A piece of soft rag may be used in place thereof, but will not be so easy to use.

PHOTOGRAPHY BY ARTIFICIAL LIGHT.

By R. J. Moss.

There is no doubt that photographers, as a rule, do not have a particularly rosy time during the winter months, owing to the short days and bad light; in fact, there are often days when it is impossible to get a negative at all, consequently an artificial light would be a great boon, provided, of course, that it was reasonable in price, easy to obtain, simple in management, and not offensive to the sitter. Many illuminants, by which negatives can be obtained, have been introduced, but all fail in one or other of the points above mentioned. The electric arc stands first, but is only available to a very limited number of operators, while the cost is a very considerable item; limelight or oxy-hydrogen comes a good second, though the trouble of getting oxygen and attending to the lime, &c., almost preclude its use; magnesium, in various forms, does wonderfully well, but there are many objections, not the least being smoke and smell, while the suddenness of the glare frequently disconcerts the sitter. However, a new illuminant has recently been introduced, called acetylene, which is produced in the most simple manner, and, being a gas, is easily controlled and directed; the luminosity is very intense (about 240 candle power), while the light is absolutely white, very nearly approaching daylight. These qualities render it worthy of the careful consideration of the photographer, but there is yet another quality, even more important still, viz., diffusiveness, the light seems to penetrate every corner of the room, giving to all objects very nearly the same appearance as in the daytime; and, though it can be intensified in any particular direction by the aid of reflectors,

even then unnatural appearances or ghostly effects are scarcely apparent.

I have no doubt that many photographers know all about it; but, as there are a lot who do not, I purpose giving a brief description of what it is and what can be done with it, with just a word or two on how it is obtained.

In the first place, a substance called calcium carbide is produced, by submitting lime and coke (or some other form of carbon) to the intense heat of an electric furnace; the resultant matter, when cooled, is a hard, greyish mass, which, when broken up, is not unlike the original coke, though much heavier; this is carbide of calcium or, as it is now generally called, calcium carbide. Some few years back an American chemist, named Wilson, experimenting with this substance, accidentally discovered that, if brought into contact with water, it evolved a gas, while subsequent researches proved the gas to be inflammable and also to possess great illuminating power; in reality, it turned out to be the acetylene of the laboratory, which had been known to chemists for over fifty years, but which could only be produced at great expense and with considerable trouble and risk. I will not dwell upon the subsequent experiments, the encouragements and disappointments which were experienced before it was ultimately placed on the market; suffice to say, that difficulties of no simple nature were met and surmounted, not the least of these being to find a medium by or through which it could be utilised for illuminating purposes. The main element that gave to the gas its wonderful brightness, viz., carbon, was by the very superabundance a tremendous source of trouble, which has not even now been entirely overcome, though sufficient has been accomplished to allow of the general use of acetylene either for photographic, lantern, or domestic illumination.

Acetylene may be produced and made available for use in two ways:—

Firstly.—By submerging a quantity of carbide in water and providing a receptacle which will hold all the gas given off and at the same time exercise the necessary pressure to force the gas to the burners; this plan would require a very large holder to contain the necessary quantity of gas, and is therefore quite out of the question for photographers, who must rely upon the second as the only system by which a portable apparatus is possible, viz., an automatic arrangement, where the presence of a certain quantity of gas immediately removes the carbide from the influence of the water, this action at once arresting the decomposition of the carbide and the evolution of gas. There are three groups of automatic generators:—

1. Those in which the water is dripped on the carbide, the supply of water being shut off by the raising of the gas-holder.

2. Those where the carbide is suspended in a simple gasometer, which, being raised by the gas, lifts the carbide from the water.

3. Those in which the gas-holder is fixed and the water forced back by the pressure of the gas as it is generated.

In all kinds the consumption of gas by burning allows the water to again reach the carbide. Judging by the patent intelligence, there must be something like 200 different acetylene-generators in the United Kingdom alone; consequently I am not going to select or mention any as specially suitable, I would rather emphasise those features which are

absolutely necessary, viz., simplicity, good, regular pressure, and ease of charging or recharging; portability is, of course, understood to be the most important, so that customers can be visited at their own homes, as this would prove an immense advantage for invalids or ladies in evening toilettes, &c., and would naturally lead to increased business.

There are quite a number of patent burners on the market, but the one most suitable for photography is still Bray's 00000 union, which is retailed at 2*d.* each, or 1*s.* 6*d.* per dozen. It is true that after a time carbon is deposited in the gas passages in such a quantity as to spoil the shape and interfere with the brilliancy of the flame, but the cost is so slight that they can be easily replaced, and one will often last six months, and generally three, before it becomes unfit for use, provided it is cleaned occasionally with a stiff tooth or other brush. I will therefore take this burner as the standard of light and cost. The photometric capacity is sixty candle power, the same as that of the incandescent mantle; but one Bray's 00000, with acetylene, is quite equal in illuminating power to two incandescent, using coal gas. This burner consumes one cubic foot of acetylene gas per hour; one pound of carbide gives off five cubic feet of gas; therefore, taking the cost of carbide at 5*d.* a pound, each burner costs 1*d.* per hour; so that, if six burners are used and the operation takes ten minutes, a negative is produced for 1*d.* Some generator-manufacturers claim that a good photograph can be obtained with one-second exposure, provided that a *rapid* plate be used; this may, or may not, be correct; but a really good photograph of the writer was secured with two burners only (an ordinary lantern jet, with reflector, being used), the exposure was about twelve seconds, with an ordinary rapid plate; one of these was submitted to the Editor of THE BRITISH JOURNAL OF PHOTOGRAPHY for his opinion.

The most suitable arrangement, however, is six burners, with mirror or white-enamel reflector, to throw the maximum of light in the direction required; with this a photograph nearly equalling daylight results may be obtained by only a slightly increased exposure, though this can be reduced by the use of extra-rapid plates.

A good deal of nonsense has been talked and written about the danger of acetylene; it is perfectly true that explosions and accidents have taken place, but nearly all these were caused by gas being compressed in the same manner and to the same extent as oxygen. This practice is now universally condemned and generally discarded; experience has proved that, when acetylene is produced in and held by a reliable and carefully constructed apparatus, of low or moderate pressure, it is *perfectly safe*, though one *must remember* that it *is a gas*, and consequently *no light should be brought near* the generator when charging, recharging, or emptying the apparatus, or *even to look for a leak;* and, though the quantity of gas present at any one time in an automatic generator is too small to do serious damage, even then it is much better not to run any risk at all.

I think enough has been said to give a general idea of the properties and methods of production of acetylene; I have shown that it is suitable for photography and that it may be used with confidence and safety; I would also remind readers that it has long since passed the experimental stage and is at the present time being used in a large number of studios where electric light is not obtainable. I will now close with one word of

caution to intending users: Do not introduce *any apparatus* into your studio for *actual work with customers* until you have made yourself thoroughly *familiar with the working*, and this is better done out of doors, on account of the smell which is allowed to escape when apparatus is opened by the inexperienced.

THE CORRECTION OF DISTORTION PRODUCED BY TILTING THE CAMERA.

By C. Welborne Piper.

I have been investigating this subject for some time, but find that I cannot corroborate the results arrived at in the editorial article of August 20. So far as I have at present progressed, as the result of tentative graphic experiments, it appears that the angle of inclination of an approximately correct copy is never less than the original angle, yet the writer of the article in question, in the particular case he is considering, makes it about 11° as against an original angle of 12½°. He also makes the respective angles of negative and copy equal, yet I find that in all cases, with the exception only of a few never likely to be met with in practice, the required angle of inclination of the negative is less than that of the copy.

Furthermore, upon testing the diagram described in the article, it appears that the 'correct' copy is not square, the width being greater than the height. There is obviously an error somewhere in the calculations. I understand that the distorted image referred to in the article of July 23 is the same as that described on August 25. In the former article it is stated that the mean width of the image equals 4 inches, and in the latter one that the maximum and minimum widths are as 25 : 23. The greatest width must, then, be 4⅛ inches, and the least 3⅝ inches, and, as according to the construction of the diagram described in the second article, the top of the image is enlarged to the width of the bottom, it follows that the width of the copy must be 4⅛ inches, while the height scales only 4 inches.

To secure a corrected image 4 inches square, the top of the image should be enlarged and the bottom reduced to exactly 4 inches; but it is certainly doubtful whether it is possible to do this and at the same time preserve the correct height. Up to the present my investigations tend to show (I cannot speak positively) that the perfect correction of the distorted image is an impossibility unless the lens is precisely the same distance from the negative as it was originally. This practically means that the original lens cannot be used, and one of a shorter focus must be substituted. In this I believe I am in agreement with Mr. Wheeler, judging by his letter of August 6 (I cannot refer to his original articles), but on another point I must disagree with him absolutely. He states, if I understand him correctly, that the vertical distortion of the image depends solely upon the angle of inclination, and not upon the distance. This is wrong, as can be clearly proved by graphically testing the effect of moving the camera to and fro upon the axial line of the lens without disturbing the angle of inclination. In practice this condition might be fulfilled in the case of a building situated upon a steep slope; if the ground is level, the angle alters with the distance, and the effect of

different distances upon the relative amount of distortion is not so apparent. If we examine separately the distortion of the upper and lower portions of the image, below and above the axial line, we find that the former is reduced in height at any distance, but the height of the other may be either increased or reduced.

The nature of the distortions of the lower part of the image at different distances may be classified as follows, a correct image taken at the same distance being the standard of comparison in each case:—

1. At a certain distance (equal to the actual height of the lower part of the object multiplied by the cotangent of half the angle of inclination) the width is increased without the height being affected.

2. Nearer than distance 1, both height and width are increased.

3. Farther than distance 1, the width is still increased, but the height is diminished.

As regards the image as a whole—

4. At a certain distance nearer than 1, the total height of the image is correct.

5. At a distance nearer than 4, the total height is increased.

6. Beyond distance 4, the height is diminished.

7. Beyond a certain distance (near 1), the total height is less than the minimum width.

8. The horizontal distortion of the whole image decreases steadily as the distance increases. The vertical distortion, or dwarfing of the image, increases with the distance beyond 4.

The distance at which exposure is usually made is somewhere between 1 and 4, consequently the conditions of greater or less distances are not likely to be met with, but perfect correction of the image would appear to be impossible under some of these abnormal conditions, and so the question arises, Is it really possible in any case? In No. 3, for example, it is necessary to increase the height and simultaneously reduce the width of the lower portion of the image, while both width and height of the upper portion must be increased. The method of making such a correction is, at any rate, not very apparent, for how can the width of the lower portion be reduced without also further reducing the height? This is an exaggerated case out of a number of others which are all more or less governed by the same conditions.

If absolute correction is impossible (I am not prepared to say positively that it is), excepting under the condition that we retain the original relative position of lens and negative—using a lens of shorter focus so as to bring the image within a reasonable distance—to meet other circumstances we must rely upon obtaining approximate accuracy by tentative adjustment. Here the main difficulty is the inconvenience of adjusting both negative and copy when they are some distance apart. If a studio stand with vertical rack adjustment is available, the trouble is lessened, for, by raising or lowering the camera (at the same time lowering or raising the lens to keep the image upon the plate), an oblique view of the negative can be obtained, and much the same effect produced as by inclining the negative. The swing is, of course, also brought into play, but the whole of the adjustments can be made at one end of the system without touching the negative. If the distortion is considerable, the negative may be first slightly inclined, and this will lessen the extent to which it is then necessary to raise or lower the camera.

MICRO-PHOTOGRAPHY AND THE POLARISCOPE.

By W. J. Bishop.

In the course of my studies in the polarisation of light and attendant experiments thereon, I have observed that the usual method of arrangement of the polariser and analyser does not give the best results to be obtained from the use of Nichol's prism attached to the microscope. I have tried a method of arrangement, which, so far as I can learn, has not been tried before. The usual plan has been to take out the top lens of the eyepiece of the microscope and insert Nichol's prism in its place, the polariser being placed beneath the microscope stage. In my arrangement I place the Nichol's prism as close to the objective as I can, but do not alter the position of the polariser. This arrangement not only gives a much higher magnifying power with the same lenses, but also gives a black back-ground to the crystals, and enables the image to be thrown on the focussing screen of the camera and a photograph of the crystals to be taken. The exposure required varies according to the magnifying power of the objective.

COPPER AS A DEVELOPER.

By Edwin Banks.

When photography was young, in the days of the Talbotype and wax-paper processes, gallic acid, and afterwards pyrogallic acid, were the only developers the photographer had at command. It was not until after the introduction of collodion upon glass that the more energetic and clean-working ferrous sulphate was introduced, and from that time pyrogallic acid ceased to be employed in the studio, and became almost unknown to the working photographer. Modern dry plates, with films chiefly of bromide of silver, without any free nitrate present, could not be reduced by ferrous sulphate, and thus pyro alkali once more came to the front, and has occupied premier position ever since.

Endless researches have been and are still being made in the almost infinite region of the carbon compounds in order to discover new and more powerful reducers; but, although many have been added to the list, pyro still holds first place, and probably will continue to do so as long as such investigations are confined to complex organic compounds. It is quite within the region of probability, however, that our 'old and tried friend pyro may have once more to retire in favour of a more energetic developer.

A few months ago I drew attention to the remarkable fact that cuprous chloride and cuprous bromide acted most energetically in developing the exposed plate, and for some time I thought that another most powerful reducer must be added to our already long list if only certain peculiarities of its action could be overcome and controlled. These were, first, almost uncontrollable energy, which the addition of free bromide or chloride only increased; and, second, a thinness and flat appearance in the most exposed parts of the film, sometimes almost amounting to reversal. The negatives were full of detail and vigour in the deepest shadows and middle tints, but, beyond that, both density and

detail seemed to be lost. Further experiment and investigation, however, revealed the cause of this, and I was very reluctantly compelled to relinquish any hope of practical utility in this direction.

Cuprous chloride and cuprous bromide are white crystalline salts, insoluble in water, but soluble in ammonia and alkaline chlorides or bromides. Their solution in ammonia is very unstable, passing rapidly, by absorption of oxygen from the air, from the colourless cuprous to the deep blue cupric state. The chloride and bromide solutions, however, keep fairly well, but do not act as a developer until rendered alkaline with ammonia. As is well known, development consists of reduction of the exposed bromide of silver to the metallic state and a simultaneous oxidation of the developer. This oxidation in the case of the copper subchloride and sub-bromide results in the formation of cupric chloride and bromide, which first acts in restraining further development and then bleaching in the well-known manner the parts that have been developed, so that there is the curious phenomenon of a picture being perfectly developed and then undeveloped in the same solution. Further investigation showed this development was not due entirely due to the copper when in the state of chloride or bromide. This may be best explained in the form of the equation

$$2Cu_2Cl_2 + O = Cu_2O + 2CuCl_2$$

by which it will be seen that the double molecule of cuprous chloride is split up by the oxidation, and cuprous oxide and cupric chloride formed.

The development, therefore, is mostly due to this cuprous oxide, the powerful reducing properties of which were pointed out nearly twenty years ago by the late Mr. Carey Lea in the pages of The British Journal of Photography. Up to the present time, however, no attempt appears to have been made to render this available in photographic work.

Cuprous oxide is a ruby-coloured powder, insoluble in water, but freely soluble in ammonia, in which it forms a colourless solution, which, however, is so greedy for oxygen that it absorbs it rapidly from the air, and is converted into a solution of cupric oxide of an intense blue colour. The best method of keeping it is to put a freshly made portion of the cuprous oxide and an equal quantity of copper turnings or filings into a stoppered bottle and fill up with ammonia. This would keep colourless fairly well as long as the atmosphere has no access to it, and any cupric oxide formed by opening the bottle for use is speedily reduced by the copper filings.

My object in writing this is to point out a method by which the energy of this powerful reducer may be controlled, and its valuable properties rendered available to the photographer. Mr. M. Carey Lea recommended that a solution of gallic acid, with the addition of one or two drops of the ammonia cuprous oxide, should be employed, and this acts very powerfully; but it is rapidly exhausted, and loses all developing power, whilst the gallic acid becomes black and dirty. Also, to get a complete development before atmospheric oxidation took place, it was necessary to add so much of the cuprous oxide solution that it was absolutely uncontrollable in use, the image flashing out rapidly and passing so quickly through all its stages of development up to fog that the operator had little chance of a successful result.

The method of overcoming these difficulties is, however, compara-

tively easy, and depends upon the fact that the salts of hydrazine and hydroxylamine have the property of reducing cupric salts to the cuprous state. When an ammoniacal cuprous oxide solution has become of an intense blue colour from oxidation, the addition of a few grains of either of these salts at once decolourises it and restores its energy as a reducer. If, therefore, to a solution, say, of five grains per ounce of hydroxylamine sulphate, one or two drops of cuprous oxide solution is added, a clear colourless developer of great energy is obtained, and one that is fairly stable, and also one that is clean working and does not in any way stain the film. It is easy to show, if space permitted, that the development is not in any way due to the hydrazine or hydroxylamine. The sole function of these salts is to *reduce the reducer* by robbing the cuprous oxide of the oxygen it has absorbed during development, and the developer will thus retain a uniform energy until the whole of the hydrazine or hydroxylamine salt is exhausted. In practice it will be found that the sulphates are better than the hydrochlorides in order to avoid the formation of cupric chlorides as a by-product. A small portion of cupric bromide is formed, but that only in sufficient quantity to make a cleaner image by its powerful restraining action.

Another difficulty, however, arises from the oxidation of the hydroxylamine salts, and it is one which has caused the disappearance of this developer from the photographic laboratory. This will be seen by the equation

$$NH_2OH + O = H_2O + NOH.$$

The result of oxidation is the formation of water and the inert hyponitrous acid, which forms in the film in small bubbles or blisters, which gradually increase in size until the film is either riddled with holes or floats bodily off. The addition of grape sugar or of oxidised cane sugar, however, completely prevents this.

In the use of cuprous oxide as a developer, it will be found necessary to considerably reduce the exposure of the negative, yet development will be found to be clean, free from fog, and perfectly under control.

Although not directly connected with my subject, yet a hint to those who are in the habit of employing ferrous oxalate either for negative or paper prints may be useful; that is, that hydrazine or hydroxylamine salts also reduce the ferric salts to the ferrous, and so prolong the life and increases the energy of this useful developer.

ON ENLARGING AND OTHER MATTERS.

By 'Hussar.'

At the risk of going over ground that may have been passed over before, I here will jot down some hints on enlargements and other matters which I have found very useful. Judging from the questions of correspondents to editors of photographic journals, there appears to be nothing, however simple and however often asked before, that is not again and again queried. One cannot but marvel at the inexhaustible patience required from the long-suffering editors. Most of these anxious inquirers, if they

practised a little experimenting, would save a great deal of trouble to themselves and others, and, by finding out for themselves, fix the information so obtained permanently in their minds.

I began photography many years ago without the aid of an instructor; I was in an isolated station in India, there were few then of those useful handbooks that are so plentiful now, and consequently I had to puzzle out most things for myself; of course, the dust bin was full of my failures, and I cannot exactly say that I found photograhy a specially inexpensive pursuit; but it made me think for myself, and I had no occasion to regret it.

For my enlargements from quarter plate I have an ordinary enlarging lantern; but, as I enlarge a good deal from whole-plate size, and being unwilling to pay the considerable sum necessary for a lantern with an 11 inch condenser, I constructed a daylight enlarging apparatus in the following manner:—My dark room is about 10 feet square floor measurement, and has a sloping roof on one side, facing the north, with a small sky-light in it, 18 in. by 12, about 5 feet from the ground. This sloping roof I find a great advantage, as it dces away with the necessity of a reflector, an unsatisfactory arrangement, in my opinion, at the best of times, and permits of an even illumination. Being a bit of a carpenter, I constructed a sash to fit over the window, having four grooves into the three outside ones, ruby glass, of different degrees of density slide; the inner groove carries a quarter-inch board, removable, in the centre of which is an opening with a rabbet round it large enough to take a whole-plate negative; a long extension camera is fixed over the opening by hinges to the board and is closed by a hook and eye; the negative is kept in position in the opening by means of two buttons on each side, at the distance of 18 inches beneath the camera, and parallel with the axis of the lens runs a wooden bar 2 inches square bolted to the slope of the roof at one end, and the other end resting in a wooden socket fixed to the floor; on this bar runs a saddle which carries the easel, and it can be clamped to any part of the bar, according to the size of the enlargement required. The whole machine can be taken down or put in position again in two or three minutes, and by making marks on the bar and the camera the correct focus can be immediately determined. Should all the actinic light be required to be shut off, one or more of the ruby glasses in the window can be lowered. A further 'dodge' I find useful, I fasten with drawing-pins on the easel narrow strips of black paper along the length and breadth of the picture, as thrown upon the easel; I can then fasten my bromide paper squarely on the easel in a faint light, without using a lens cap with an orange or ruby front.

A wrinkle which appeared in the Almanac for 1894 I have found of the greatest use. It is for focussing dense negatives, or, in case of a small stop being required, to fix and dry an unexposed plate of the size of the enlarging negative, then draw horizontal and vertical lines on it ½ inch apart, with a fine mathematical pen and Indian ink, substitute this for the negative, and the finest focussing can be obtained without difficulty.

The developer I use for bromide paper is invariably amidol; it requires less exposure, a blessing when the illuminant is an oil lamp, and the development can be arrested at any moment and restarted merely by flooding with water, which is not the case with the iron developer.

PLANTS FOR THE STUDIO.

By Chas. H. Evans.

From a decorative point of view, as well as an aid to photographic composition in portraiture, it has long been recognised in good establishments that plants are a desiderata. Therefore a short list of some good foliage ones that are often passed by will be useful to many.

One reason why plants do so badly as a rule in studios is that the atmosphere in those places is usually too dry and stuffy, and the usual studio is too lofty a building to be good as a plant-house. Still there are some things that object less than others to those unnatural conditions among which are: *Aspidistras*, both the green and the variegated varieties; *Ficus elastica* (the well-known indiarubber plant); *Aralia Sieboldi* (said also to prevent flies being a worry; I cannot verify this, not being troubled with flies).

The above are often found in studios, and are eminently useful; so are the following, which are not so commonly met with: *Dracena indivisa* and *D. australis*, also *Anthericum lilastrium variegata*.

As regards palms, all are beautiful, but the majority are a snare and a delusion as regards long life in a studio; but *Seaforthia elegans* is to be depended on, and *Latania borbonica* and *Kentia balmoreana* are fairly good for some time. I once used for a couple of years an *Abutilon*. This plant is apt to grow very leggy, so pinching in occasionally makes it grow bushy, and its vine-like leaves are very pretty in a corner of a photograph.

Of shrubs proper, the broad-leaved Veronica is very pretty, so is a myrtle. Climbers in pots are very effective if naturally trained over a few rough twiggy sticks, the large-leaved Virginia creeper (*Ampelopsis hederacea*), Irish ivy, also the grape vine.

Of deciduous trees, splendid use may be made of small specimens, in seven-inch pots, of the following: Sycamore, horse-chestnut, mountain ash, fig, variegated maple, and the laburnum. In the autumn, when the deciduous plants drop their leaves and are but little use, plunge the pots to their rims, out of doors, in earth, and they are all right again next year, when the buds begin to burst. The evergreen varieties, if put out of doors when there is a warm rain on, is a perfect reviver, or a syringing with water, about 65°, is just as good. A very little trouble, indeed, is the attention required for a few plants, and their usefulness cannot be over-estimated.

NOTES ON HAND CAMERA WORK.

By Herbert S. Starnes.

Two important obstacles to successful hand camera work in the present day often appear to be, failure in obtaining a proper balance of light and shade in the picture, and slight want of sharpness, due to vibration of the camera. Very few snap-shottists trouble sufficiently about the relative amount and position of the lights and shadows in the subject they are about to photograph. They think only of the size and grouping of the objects, and yet we find that, as a rule, the success of the best pictures

at an exhibition is due simply to the proportion and position of the principle lights and shadows. The printing and toning are no better, the quality of plates and lenses used are the same, no better grouping or balance of lines. Nothing but the light and shade in them to give them their beauty. Sometimes they only consist of a dirty pond, a bank, and a few clouds.

Therefore, instead of bothering so much about printing processes, lenses, plates, &c., study the laws of light and shade. If a picture, engraving, &c., pleases look at it from from a distance where you cannot distinguish the detail, and note the positions and strength of the lights and shadows, and then try to reproduce them in your negative. If a portrait, you have the background and accessories to group round the figures to obtain the necessary light and dark half-tones, you do not require to lump in all the odds and ends to be found in the window of a second-hand furniture shop as accessories.

If a landscape, there is the sky space to fill in, but let the clouds be nothing more than a background to the landscape, to connect and complete the range of tones in the latter.

As to vibration of the camera during exposure. I have always held that the proper place for the button or release is in the front of the camera, with a backward push towards the plate, and that the first finger of the right hand is the best to use, as it is the most independent (through long practice) of the other muscles in the hand. Some cameras have a trigger or release on the right hand side, to be depressed with the thumb, the first finger holding the bottom of the camera. Most people if they move the thumb downwards towards the first finger will find that that finger will endeavour to meet it half way, *i.e.*, the muscles will force both towards one another, and I believe that vibration of the camera on exposure, is not due to the action of the thumb, but to the muscles of the first finger giving a slight cant to the camera upwards. This might be avoided by having a dummy spring at the bottom of the camera (of the same tension as the trigger), for the first finger to press against, and I believe when two hands are used, that the vibration is due to the muscles of the left hand holding the camera too firmly, producing a recoil when the push is given to the button on the right side of the camera by the right hand.

A HINT REGARDING THE CYANIDE OF SILVER INTENSIFIER.

By H. J. Channon.

Some years ago I carried out a long series of experiments with the object of examining and comparing all the various methods of mercurial intensification then in use, measuring the gains made in printing density in each case, and testing the particular qualities resulting from each variation in treatment. As may be supposed, it proved a very extensive undertaking, even though done in a somewhat rough and imperfect manner; and, as a matter of fact, I did not accomplish my object, so the voluminous notes made at the time are likely to be of little use. Still, some matters are touched upon in these notes which may possibly be interesting, and it is about one of them, relating to the cyanide of silver method of

treatment, that I am writing these few lines. Mr. Chapman Jones has recently brought the subject of mercurial intensification very much into notice by the publication of valuable and interesting papers, in which he attempts to treat the matter on sound scientific principles. His opinion of the cyanide of silver method is decidedly unfavourable, and, on the whole, I am inclined to take a similar view, having found like him that plates so intensified are very liable to discolour in the clear parts on insolation; but yet, as this process is very much employed in practical work, and will probably long continue to be used, it may be worth while to give a hint concerning it. Mr. Jones objects to the process also on the ground that it alters the ratio of the gradations of the densities of the negative, but this, I think, is perhaps not an essential feature in it, and may depend upon the matter I am about to refer to. The point I have in mind, then, is simply that the results of this method of intensification must depend very much upon whether the solution of cyanide of potassium is *fully saturated with cyanide of silver*. Cyanide of potassium alone has, of course, a strong reducing action, and, if only a small proportion remains uncombined in the solution, it will attack the deposit during the whole time of immersion, acting especially strongly on the weaker parts; hence the degree of intensification obtained must then become most uncertain, while at the same time the ratio of gradation will be disturbed. Now, when the directions usually given for preparing the solution are followed, that state of things must almost necessarily result. We pour a solution of cyanide of potassium a little at a time into one of nitrate of silver; at first a thick creamy fluid results, with a large quantity of very fine matter in suspension; suddenly, when the cyanide becomes present in excess, and its solvent action commences, the fluid becomes quite clear, owing to the finest particles being first dissolved, and at every further addition it is always the finer of the remaining ones which are soonest to disappear; consequently, at the end of the process, there will remain only a quantity of coarse, heavy grains which settle quickly to the bottom of the vessel. The last additions will have left a proportion of free cyanide of potassium in the supernatant solution; its solvent action on these coarse grains will be very slight, and, as only an extremely small quantity of the solution can come at any particular time into actual contact with these particles, it will easily be seen that for the whole bulk to be fully saturated with silver from that source in any reasonable time is not to be expected. The remedy is not difficult to discover; by simply reversing matters and adding nitrate of silver solution to potassium cyanide solution till a permanent precipitate remains, a fully saturated solution is easily obtained. The importance of the method of mixing is very familiar to photographers in the case of the ferrous-oxalate developer.

One of my experiments rather strikingly illustrated this matter. A plate having a longitudinal band of even density all through, estimated to correspond to a *printing transparency* of ·26, was cut into a number of strips; these were fully bleached (all together) in the bichloride solution, thoroughly washed, and, for convenience, dried. A silver cyanide solution had been prepared in the ordinary manner, well stirred, and plenty of time allowed for as much as possible of the silver precipitate to be taken up. One strip was immersed in this till apparently fully blackened (between five and ten seconds), then quickly and thoroughly

washed; it showed great increase of density. Another strip was next immersed in the same solution and darkened equally quickly, but was left in for five minutes before washing. A remarkable change had then taken place; practically the whole increase of density had been lost, and scarcely any difference in appearance could be noted between that strip and an unintensified one from the same plate. My subsequent photometrical work showed that in the case of the shortly immersed strip the original printing transparency of ·26 had been reduced to ·09, while in the other it came out at ·23, or practically the same as before treatment. A corresponding experiment was next made with a silver cyanide solution mixed as described in the reverse manner, one strip being immersed for seven seconds and another for seven minutes. On examination these proved to be practically alike, visually and photometrically, and just similar to the shortly immersed one of the previous experiment, no reduction, in this case, having resulted from prolonged treatment. Evidently, then, the second solution is the more trustworthy one, and, although good results may be gained by *correctly timed* treatment with the other, its effect must always be uncertain and its action on gradation injurious. *Short immersions* in this darkener I have found, too, are to be avoided, as rendering the plates especially liable to discolour afterwards.

ALBUMEN PAPER *V.* GELATINE.

By William Brooks.

Have our prints improved since the introduction of gelatine paper in the place of albumen? As far as my experience goes, I think not. I have yet to see a gelatine printing-out paper that will approach in quality the old albumen paper print.

There are now many papers made under various names. Some say gelatine prints are more permanent than on albumen; only the other day I was examining some prints on gelatine, and found worse evidence of fading than on albumen. Nearly all the papers, independent of fading, have an inlaid look about them. I am inclined to think that the truth is that it meets the rage for the so-called quick printing, thin negatives. In these days of high pressure speed, neither permanency nor quality are aimed at, but only getting the work out of hand.

Take, for instance, prints made say thirty years ago, there was more pluck and vigour than the productions of to-day. At the present time I have some prints made on albumen paper over that time considerably, and they are as fresh as the day they were made.

We have not to go far if we look into how those prints were made. In those days the negatives were of a different type, being much more intense than the ones of the present day. I remember the time we used to sensitise the paper with 100 grains of nitrate of silver to the ounce of water, then as time progressed the salting and sensitising began to get weaker and weaker, and I dare say now that not more than twenty-five grains of nitrate to the ounce is used. Before printing in silver was understood as it is now, the sensitising solution was too strong for the negatives of that time, and after a time a sixty grain solution was used with a lower salted paper, and this seemed to give the perfection of prints.

Albumen was always blamed for fading or turning yellow; that might hold good in some cases, especially if stale albumen was used.

All the photographic papers were supposed to be made from rags, and I always attribute one cause for fading to how the paper was sized. I know that any cotton fabric sized with gelatine mostly turned yellow after a time, whereas a paper sized with starch always kept white. I have some paper in my possession now (photographic) bearing the date 1850, as perfectly white as on the day it left the mill; this is starch sized.

Any print made on albumenised paper intended for framing I always give a good coat of encaustic paste, this is a great preventative against fading. I therefore think that albumen paper will hold its own for ordinary printing for many a day yet.

FEW REMARKS ON CARBON PRINTING.

By V. C. Baird.

Many workers in a small way must have been deterred from attempting the most beautiful of our printing processes, namely, carbon, from the rather misleading statements made in the text-books, which, though correct, are insufficient and not the whole truth. For instance, the general statement that home-sensitised tissue will only keep two or three days at the most, alone prevented me taking up carbon printing, as I might sensitise the tissue and then find something come in the way to prevent my doing the prints in time to save it. Although the manufacturers' tissue keeps for a fortnight, each colour is only supplied in packets of one dozen pieces, the result being to the small worker, if he wishes to do several prints of different colours, he has to buy one dozen pieces of each colour, and, after doing one or two prints, the rest of the material is lost, making the process very expensive. Home-sensitised tissue can be made to keep perfectly for ten to fourteen days, if the sensitising bath is made just sufficiently alkaline with liquor ammonia to turn red litmus paper blue. The instructions given in the handbooks for sensitising the tissue are explicit and very easily carried out. If the tissue is bought in bands and cut up in pieces, say, equal to four or six half plates, quarter of an hour will sensitise a considerable quantity of tissue, so the question of time occupied sensitising need hardly be taken into account. I do more carbon printing in winter owing to the dark evenings; the tissue will, if sensitised about six o'clock, be quite dry by ten o'clock if hung in an ordinary sitting-room where there is a fire. After the tissue is dry it should be cut up and kept under pressure. I use an ordinary printing frame with an opal glass covered with black paper; and this leads to another point in the text-books, or, rather price-lists, the special apparatus recommended is simply appalling, a quarter plate developing tank, 4s.—mine, made by a local tinsmith, 24 × 18 inches, cost the same. Little or no additional apparatus will be required beyond the average amateur's outfit.

The sensitising bath generally recommended is one ounce bichromate of potassium to twenty ounces water, this strength makes a tissue far

too rapid for the average gelatine negative of to-day, forty ounces of water will give a rapidity much more manageable, and about two to three times that of ordinary P.O.P. However, the extra rapidity of the stronger bath will be found useful in the darkest days of winter. For transparency work the bath may, with advantage be still further diluted, namely, sixty to eighty ounces water, to one ounce bichromate, especially when using tissue other than transparency. Another matter often referred to is the continuing action in printing after the exposure has been made, this is quite true if the tissue is taken out of the printing frame and exposed to the air, but if the print is kept in the printing frame under pressure this continuing action may be disregarded.

ALL HALLOWS', BARKING.

By C. H. Crosby (Chicago).

On the eve of my departure for a brief vacation in England in 1895, a friend of mine, who is an enthusiast about the history of the Tower of London, and the possessor of a large collection of lantern slides pertaining thereto, remarked that he had never been able to procure any photographs or slides of the ancient Church of All Hallows, Barking, which he much regretted, as it had an intimate connexion with the Tower. My quest in London was equally unfortunate, and, moreover, I was somewhat surprised to find that many of the dealers in slides and prints had never even heard of the old church. Nothing was left but to attempt some photography on my own account, in the course of which I had a provoking but amusing experience.

I paid a preliminary visit to the church, and was told by the good dame in charge that, to her knowledge, the interior of the church had never been photographed, except some years before, by a professional photographer. The thought that I was upon ground untouched by brother amateurs gave great zest to my feelings, and, having obtained permission from the Vicar of the parish, I appeared upon the scene the next day duly, equipped for the undertaking. It may not be out of place, however, as The British Photographic Journal Almanac is read by thousands who are not Londoners, to say a word or two about the church.

All Hallows' (All Saints'), Barking, is near the Tower of London, at the foot of Great Tower-street. It is mostly of that style of architecture called 'perpendicular,' but has a charm for its lack of strict adherence to any one style. I could not ascertain the date of its erection further than that it was before the time of Richard I., and that it was founded by the nuns of Barking Convent in Essex, and it is said that the Abbess of the convent, when she came to London with a numerous train of officers and retainers, would hear mass in the church before proceeding with her business affairs. The church is sadly crowded and elbowed by narrow streets and buildings, and great slices of its ground have from time to time been cut away for street purposes. A police office is on the opposite side of a narrow street at the west end of the church, and some thrifty vestrymen, so I was told, built many years ago a warehouse against the church on a small corner by the spire, that had escaped base uses previously. Across the way is a tavern called the Czar's Head, said by some

to be the original tavern, and by others to occupy the site of the original tavern where Peter the Great used to resort after his labours in the shipyards on the Thames hard by were finished. The tavern is still liberally patronised.

The east end of the little graveyard that is left backs up against a big coffee and spice mill, the second-story window of which afforded the only practicable point for a photograph of the church, as will speedily appear. The day of our visit was quite foggy, and that of a yellowish hue; but there was no help for it but to set up the camera in Seething Lane, a polite police-sergeant having told us there was no objection if we did not obstruct the street. Well, *we* did not obstruct the street, but in less than five minutes the street *was obstructed* by a mob of perhaps fifty men and boys, who seemed to have sprung out of the ground for no other purpose than to vex us. Forming in line across the front of the camera, they put themselves into the most grotesque and ludicrous attitudes, embellished with expressive pantomime, highly flavoured remarks, and roars of laughter. It was as good fun for them, no doubt, as bear-baiting for their forefathers, if they ever had any.

Expostulation being of no avail, we tried the plan of lighting a pipe and sitting on the curb until they saw fit to leave, but it was a failure, for they lit their pipes and waited also. It has been a source of great regret since, that, instead of packing up the camera as we did, and leaving in disgust, we had not exposed half-a-dozen plates upon this crowd of London toughs, but the chance is gone. Finally, by good luck, the manager of the spice mill allowed us to take a view from a rear window, the view showing part of the graveyard, the south aisle, and part of the nave of the church. I do not think a satisfactory view of the entire exterior could be made, except from an elevated platform or a camera on stilts.

The interior of the old church afforded a great contrast to the annoying scene outside. It was very quiet, and the light was dim within its walls. True, there was one party, I think from the Czar's Head, who insisted upon telling me his family history, but he finally went to sleep in a corner of a pew; and also a gentleman who asked me many questions, showing that he knew something of photography, but, when I told him I was giving ten seconds' exposure with next to the largest opening of the lens, he lifted up his eyes and departed.

So I was at last in peace, with all the memories of the old church crowded upon me. Here William Penn, the Quaker, the founder of our great state of Pennsylvania, was christened in 1644, and we were fortunate enough to secure a view of the top of the font and of the beautiful carved cover and ancient iron bracket supporting it. Just beyond the font can be seen part of an altar tomb, which cannot be identified, but its date is said to be not later than 1500. In the north-east corner of the chancel is a fairly well-preserved altar tomb, believed to be that of Alderman John Croke and family, about 1477. It must in its time have been a very fine memorial, but it is defaced, like many of the memorial brasses, by the chisels and hammers of the Puritan zealots.

The pulpit and the interior fittings of the church are mostly modern (about Queen Anne's time), but very substantial, and, for the most part, appropriate. At the altar was married John Quincy Adams, one of the Presidents of the United States, and over the corporation pew are still to

be seen the sword rests of iron grille work, with heraldic devices, in honour of the three Lord Mayors who were residents of the parish, the one to Sir John Eyles dating in 1727.

From its nearness to the Tower, many illustrious victims of its procedure have been buried here. The list is too long even to abbreviate, but among them may be named Archbishop Laud, Henry Howard, Earl of Surrey, Lord Thomas Grey, and many others. Space forbids us to speak of the fine brasses, that of 'Andrewe Avyngar, of London, and Ellyn his wyff,' being particularly interesting and fine, and unsurpassed by only one Flemish brass in England.

This is one of the seven or eight parish churches that escaped destruction in the great fire of London, and it is said that to its ancient spire (now replaced by a most hideous modern one) the delightful diarist, Pepys, came to witness the spread of the conflagration. In short, good judges say it is the finest mediæval church extant in London, and, as an American tourist, I can truthfully say I folded up my camera and left it with great regret. What a pity it is that the accomplished amateurs of London do not pay more attention to the memorials of the history of their city which are vanishing so fast.

My acknowledgments are due to the Vicar of the parish and to the pamphlet (an abridgment of a larger and exhaustive work) published by the Rev. Joseph Maskell, formerly Curate of All Hallows', Barking, copies of which may, no doubt, still be obtained at the church.

A PHOTOGRAPHER, SOME DEALERS, AND ALL MANUFACTURERS.

By J. Vincent Elsden, B.Sc.

Some recent experiences, probably by no means peculiar to myself, have suggested the above title to this small contribution to the Almanac.

Having run short of materials during a summer holiday, I purchased, from a provincial dealer, some dry plates, as well as some films for a hand camera. The former were a well-known brand of the highest repute, the latter were the only brand suited to the purpose.

The results, on developing the plates, did not please me, and on sending the batch number to the makers, I found them to be five years old. The films were evidently of a similar, if not greater, antiquity.

The result was the loss of a few dozen valuable exposures, simply through a misplaced confidence in the assurances of the middleman.

Now, all this could be easily avoided if the manufacturers, instead of marking each packet with a batch number, intelligible only to themselves, would state the date of preparation of the emulsion. Of course, this plan would render the disposal of "shopkeepers" difficult, but surely it would pay the manufacturer to take these back in exchange, rather than risk the loss of reputation involved in their being palmed off upon the unwary.

I am well aware that no experienced photographer would ever get his materials otherwise than from headquarters, except under the direst necessity, but this is not as it should be, and I cannot but think that the dealer would find his business increasing if he were able to guarantee the condition of his goods.

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GELATINE *VERSUS* COLLODION NEGATIVES.

By Charles Allan Ferneley.

The question has often been discussed as to whether the old iron developed collodion negatives were superior to those now produced by gelatine, and that better results could be obtained on collodion in a weak and dull light. I have found, that with a good make of fairly rapid plates, with a fair amount of bromide, full exposure, and pyro developer, very fine results can be obtained in dull weather, more especially in architecture where, if taken in extreme sunlight, the exquisite fine details would be lost.

I have been taking a series of negatives this year of Lincoln and York Minster, and on each occasion had a dull light, in some cases found it difficult to focus. I however obtained some negatives with extremely fine detail and printing power, more especially the Lincoln Doorways, viz., South Decorated, Last Judgment; Entrance to Cloister, Perpendicular and Lancet, Western Anglo-Norman one of the finest in existence, with its dog-tooth moulding and chiselled scroll-work.

If we examine carefully an old collodion negative developed with pyro, and an early one in gelatine developed with pyro, we shall find a great similarity in both; if by reflected light, a uniform brown tint will pervade the plate showing neither lights nor shadows, and by transmitted light relative value of light and shade will be seen, but still brown veilings in shadows.

In printing collodion negatives as above, eighty or ninety grain silver bath would be required, and would take several hours to print in sunshine. With the advent of iron development, a great advancement took place in collodion negatives, the high lights being nearly opaque of a brown tint, sometimes a brown-black, the shadow being clear or only slightly veiled. The negatives were quick printers, and sensitising bath from forty to sixty grain silver per ounce. The prints from a high class negative would be extremely fine and juicy with plenty of sparkle.

If we refer back and look at the works of Scotch scenery by the late G. W. Wilson, Aberdeen, England, International Exhibition, 1862, and Swiss subjects, F. Bedford, English scenery, F. York, London, and Zoological series, we should be well repaid to see again what was done in old collodion days.

At the present time we can make excellent prints from old negatives by carbon double transfer, bromide, gelatino-chloride, transparencies, and last, but not least, platinotype, as regards permanance.

When at the platinotype stall of the photographic exhibition, Crystal Palace, in or about 1888, I was struck by the beauty of prints of the House of Parliament—20 × 15—and on mentioning to the operator that I had seen a silver print from it at F. Ayling's, architectural photographer, New Oxford Street, in 1866, he showed me the negative and informed me that it was one of the finest he had used for platinotype. The negative was full of brilliancy and printing power.

For landscape and general work I am under deep impression that pyro and ammonia give the best value, tone, and power to negatives, varying bromide restrainer according to time of year and subject.

EPITOME OF PROGRESS IN 1897.

Compiled by the Editor.

STRENGTH OF HYPO SOLUTION AND TIME OF IMMERSION FOR FIXING ALBUMENISED PAPER.

CONVENTION GRANT PAPER BY A. HADDON AND F. B. GRUNDY.

The permanence of prints on albumenised paper and their freedom from yellowness with age undoubtedly depend on the elimination, by the fixing bath, of the insoluble salts of silver. Up to the present we have not been able, by means of hypo alone or with the addition of other salts, to reduce the quantity of silver left after fixation below a certain small percentage, and it is this small quantity of silver that ultimately causes the high lights to turn yellow, and finally the print to materially change in colour.

Our standard works on photography lead us to infer, since no mention is made of it, that hypo is capable of removing the whole of the silver from the high lights of a print on albumenised paper, and the usual recommendation with regard to fixing is to make up a twenty per cent. solution of hypo and immerse the print in it. The volume of such a solution that we ought to take for a given area of paper is, in almost all cases, left to the judgment of the operator.

The only mention of the quantity of hypo required for fixing paper that we have come across is given in *The Art and Practice of Silver Printing*, by H. P. Robinson and Captain Abney, page 93, where it is said that one ounce of hypo will fix with safety three sheets of paper. It is quite possible that one ounce will do this; but, if we have to take a twenty per cent. solution, using one ounce of the salt, we should have five ounces of the solution only in which to immerse our three sheets of paper—rather a small volume—unless we fix the paper in batches of half or whole sheets, which would make it a tedious operation.

We have some difficulty in discovering the origin of the usual recommendation to fix albumenised paper in a twenty per cent. solution of hypo for fifteen minutes, but finally found a recommendation very much like this in the classic research of Messrs. Davanne and Girard, published in vols. iii. and iv. of the *Photographic News*, 1859 and 1860. They recommend a solution of from fifteen to twenty per cent. of hypo, and time of immersion from ten to fifteen minutes.

We will quote their own words: 'Our experiments were made upon solutions five, ten, fifteen, and twenty per cent. This last strength appeared to give the best results, and we stopped at it, although there was nothing absolute in it; it is a medium strength, and may be diminished or augmented without any inconvenience.'

Further on they say: 'In every experiment we have made we have found that, after an immersion in the hypo bath of ten minutes, the proofs obtained

in the ordinary way, even without previous washing in pure water, were completely fixed; it is, therefore, only in exceptional cases, as in employing excessively thick paper, of concentrated baths of soluble chloride, or of nitrate of silver, that we must consider how long it will be advisable to prolong the fixing, which, as observed by Mr. Le Gray, should be as brief as possible.'

From the above it will be gathered that in 1860, in many cases, the paper on removal from the printing frame was transferred directly to the hypo solution, and with this method it was not astonishing to find that some silver was left in the paper. We must also bear in mind that albumenised paper of those days was feebly albumenised, highly salted, and not toned before fixation. Messrs. Davanne and Girard, seeing the possibility in certain cases, when the paper was not washed before fixation, of the formation of insoluble salts of silver due to the excess of silver coming into contact with the hypo, recommended that the fixing solution should be compounded as follows:—

Hypo	100 grammes.
Common salt	25 ,,
Bicarbonate of soda	10 ,,
Water	500 c. c.

Here we have definitely laid down twenty per cent. The addition of the chloride of sodium was to prevent or retard the formation of the insoluble thiosulphite of silver and sodium, and, to prevent the solution becoming acid, bicarbonate of soda entered into the composition of the fixing bath. When the intermediate washing took place between the printing and fixing, a weaker bath was recommended, and depending on the thickness of paper, the time should be varied from ten to fifteen minutes.

The quantity of silver per sheet in the paper after washing was found to be 1·3686 grammes by the same gentlemen. The maximum we have been able to obtain from modern papers is ·3186 grammes of silver per sheet. From this we may naturally conclude that most probably the images produced on these highly salted papers were mainly silver reduced from the chloride, and not from the organic salt of silver. On modern papers, on the contrary, the image is formed mainly by the action of light on the organic salt of silver.

In the experiments we have recently made, in order that the results may be comparable, we have always used the same amount of hypo per sheet of paper, whatever the dilution or concentration of the solution, and from some preliminary analyses we found that the silver was reduced to a minimum, other conditions being constant, when the hypo was made alkaline with ammonia. The quantity added was 4 c. c. to each litre of solution (about 1 drachm per 40 ounces).

It might seem at first sight that the dilution of the hypo would have little influence on its power of dissolving chloride of silver provided there was sufficient of it present, but this is not so; a one per cent. solution of hypo, when allowed to act for fifteen minutes, left in the paper 33·5 per cent. of the silver. In all cases, excepting where otherwise stated, we have compared the silver left in the paper after fixing and washing with the silver which mere washing in water was unable to remove.

As our analyses led us to the conclusion that no practical results could be hoped for by using very dilute solutions of hypo, we need not trouble with them.

The fixing bath recommended by Messrs. Davanne and Girard, and which we have already given, failed to remove more silver than does ordinary hypo.

A ten per cent. solution of hypo for ten minutes, followed by another of forty-six per cent. for five minutes, produced no better result.

We have made over forty analyses of papers fixed in different ways; the most interesting results we have obtained are shown in the following table. The different figures give the quantity of silver in grammes per sheet left in

the paper with four baths of different strengths, and the paper being left in these solutions for periods varying from five to twenty minutes.

Percentage of Hypo.	Time of Fixation in Minutes.			
	5	10	15	20
5	·0160 ·247	·0200 ·308	·0200 ·308	·0180 grammes. ·278 grains.
10	·0140 ·216	·0142 ·219	·0160 ·247	·0140 grammes. ·216 grains.
15	·0160 ·247	·0188 ·290	·0180 ·278	·0200 grammes. ·308 grains.
20	·0200 ·308	·0180 ·278	·0180 ·278	— grammes. — grains.

This table reveals one curious fact, which could only be arrived at by analysis, that is, that below and above a certain strength of hypo more silver is left in the paper than when using that particular strength.

A ten per cent. solution of hypo, in from five to ten minutes, removes more silver from paper than does a stronger solution in the same time.

This is fortunate, as by using hypo of this strength there is less danger of the delicate half-tones of a print being dissolved than would be the case if the strength of the solution were doubled. The quantities of silver left in the different pieces of paper vary, but this is due to two causes, most probably experimental error and inequality in the thickness of the layer of albumen on the paper.

Messrs. Davanne and Girard, in their paper, say that a fifteen or twenty per cent. solution of hypo, when allowed to act for ten minutes, completely fixed the proofs. It is very unfortunate that they did not give the method they adopted in order to arrive at this result.

We have experimented with two different brands of paper, and the amount of silver left in one is ·0148 grammes per sheet, and in the other ·0145 grammes. It must be perfectly clear to every one that, if the complete elimination of silver from the high lights of a print is the main condition for its permanence, then that paper which retains most silver when we have fixed and washed must of necessity be the least permanent. This also points to the fact that the preparation of the albumen or its purity has some effect on the amount of silver finally left in the paper.

In the early days of photography pure fresh egg albumen was used, but now frequently, in order to obtain extra gloss, the albumen is allowed to partly decompose before it is coated; sulphur compounds may thus be formed, which combine with the silver and are insoluble in hypo.

We thought it would be instructive to experiment with albumenised paper made some twenty years ago. We were fortunate in obtaining a couple of sheets from Messrs. Atkinson & Co., of Greenwich. The total silver in this was found to be per sheet ·6172 grammes, and silver left after fixing ·0123, less than in modern papers.

In conclusion, we have confidence in recommending that papers (albumenised) should be fixed in ten per cent. hypo made alkaline with ammonia in the proportion mentioned above, and that the fixing, unless the paper be unusually thick, be not continued beyond ten minutes.

The sensitising of the paper and the method of analysing for the estimation of silver we have already given in previous papers.

THE BICHROMATED GUM PROCESS.

THE following excellent *résumé* of this process is due to Mr. George Ewing :—

However extravagantly photographic 'artists' may rage, and the supporters of the *Salon* imagine a vain thing, much will be forgiven them for bringing to general notice the great capabilities of the bichromated gum process of direct pigment printing. Though that process has long been known—it has been in use, it is said, at the Vienna Military Institute for over forty years—it was well-nigh forgotten, and would probably have been as dead as Julius Cæsar in another lustrum had not Mr. Maskell redirected general attention to it by his exhibits at the Salon of 1893. Thereafter, one of the first to apply himself to a systematic study of the subject was M. Rouillé-Ladevèze, who, on March 14, 1894, read before the Photographic Club of Paris a memorandum giving full details of the process. But the monograph, excellent though it was, would not have availed much if it had not been supported by visible proofs of the charming pictures obtainable by a close adherence to the instructions therein given. These, however, were so far superior to anything till then seen that many of Rouillé-Ladevèze's compatriots were induced to follow him, and they were soon followed by those of other lands who longed for liberty of artistic expression unfettered by material restrictions, until, within a few months from the publication of the memorandum, the Exhibitions of London, Paris, Brussels, and Vienna showed pictures produced by the bichromated gum process that as much charmed artists as they put profane scoffers to utter confusion. Since then, studied and practised by zealous seekers after the beautiful, the process has made steady progress; and, if to-day it has not quite attained perfection, or if there still remain things unknown, the matchless results already obtained clearly indicate it as the printing process of the future. Foremost amongst those who have steadfastly laboured for its perfection may be placed three members of the Vienna Camera Club, Messrs. Watzek, Henneberg, and H. Kuhn. These gentlemen have verified, corrected, and completed the observations of Rouillé-Ladevèze, and have published the result of their investigations in the *Wiener Photographische Blatter* (Nos. 4, 7, and 10 of 1896). As their articles should save novices many fruitless trials and discouraging failures, the following *précis* will, no doubt, prove useful.

Paper.—Any close-grained, well-sized paper will answer, though Messrs. Henneberg and Kuhn recommend specially the drawing and water-colour papers prepared by Schleicher and Schull, and the 'Montgolfier' paper prescribed by Mr. Demachy This latter can be had either in white or in cream, and other warm tints, and, when the grain is close, gives most brilliant prints. More open-grained papers, Mr. Watzek says, retain the colour better, and give half-tones more easily; but Messrs. Heneberg and Kuhn assert that the rough English makes do not give pure white.

Sizing.—Whatever paper be employed, it will be advisable to size it. For this purpose starch or flour may be used, two to four parts of starch being taken to a hundred parts of water, according as the surface of the paper is more or less rough. Dr. Just, of Vienna, sells nine varieties of paper ready-sized for coating.

Colours.—The quality of the colours used is of the first importance, and our authors are particular in recommending certain manufacturers. Watzek suggests the use of pigments manufactured by either Winsor & Newton, of

London; Schmincke, of Düsseldorf; or Paillard, of Paris: but finely ground pigments of other makers will, no doubt, serve equally well. All colours are not suitable. Blacks, whether animal, ivory, or lamp-black, give the best results; blues, particularly Prussian blue, ultramarine, or indigo, are nearly as good; but browns are exceedingly difficult to work. Besides the blacks and blues named, burnt sienna and English red may be used; other colours had best be left alone.

Character of Negatives.—For the best results, transparent and soft, but by no means weak, negatives should be used. The style of negatives that give good enlargements is what is required. It is possible, however, by varying the proportion of gum and pigment, to obtain very successful prints from negatives of any character. Dr. Henneberg and Kuhn state that, by using burnt sienna, they have succeeded in securing excellent pictures from negatives that were too harsh for ordinary printing-out paper; and they lay down as a genera principle that, the more gum used, the more pronounced the gradation of tones and that an increase in the quantity of colour tends to softness.

Gum.—The gum to be used is the ordinary gum arabic sold by stationers for office use. Mr. Watzek prefers to use a ten per cent. solution, with the addition of a few drops of phenic acid as a preservative; but Messrs. Henneberg and Kuhn recommend a solution containing equal parts by weight of gum and water, without any preservative. Their experiments having shown that the longer the gum solution is kept the more sensitive it becomes, they prefer to let the solution stand till it becomes mouldy, and to then filter it for use. In this state it will keep for a long time without deterioration.

Coating the Paper.—The sensitive coating is prepared by pouring into a graduated glass measure, in equal quantities, first the gum solution, then the pigment, and lastly a ten per cent. solution of bichromate of potash, and mixing them *thoroughly*. It is advisable at this stage to test the quality of the mixture by coating thinly with it a small strip of waste paper. After drying, the surface should show the dull lustre of the crude gum. The brilliancy or otherwise of the coating is, in fact of the highest importance; for, if the layer is too brilliant, it indicates that there is too much gum, which will disappear with its contained colour in the subsequent operations, and, if the coating is very dull, the shadows of the picture will be choked. Between these two extremes a variety of changes can be rung, to suit the subjects to be depicted. As on the quantity of gum depends the grain of the image, a sufficiently large proportion should be used for landscape to secure brilliancy, and a correspondingly small quantity should be employed for portraits. In this matter each photographer must work out his own salvation. The right proportions of the constituents having been settled, the paper selected for printing is coated, in yellow light, with a thin layer of the mixture. For the purpose use a large and broad brush fully charged with the sensitive gum solution, but be careful to avoid all brush marks or other unevenness, and to lay on the coating so thinly as to permit of the underlying paper being seen. When the ground has been laid, go over it with a badger's-hair softener or broad camel's-hair brush, so as to ensure a perfectly even coating, for on this depends success or failure. The coating having been satisfactorily distributed, the paper is to be dried quickly over a stove. It is essential that the paper be absolutely dry, otherwise the colour will dissolve in washing; but care should be taken to avoid scorching, as that would produce indelible marks.

Printing.—Paper prepared as directed may be kept for a few days, but it is always advisable to use it as fresh as possible, preferably immediately after sensitising. At this stage the technical skill of the worker will have most occasion for display, since good results are obtainable only from correct exposure, and the length of exposure depends on the quantity of gum in the coating—more gum more printing. As the light impression is not visible till after development, the depth of printing has to be judged by a photometer,

Any one of the photometers commonly used for carbon work will do, though our authors employ Fernande's, and find that the blue-black tints require from 3° to 4° on that instrument (*i.e.*, about two minutes in sunlight), black colours from 4° to 6°, and brownish yellows about 10°. Mr. Watzek says, however, that the exposure, on a fine winter day and with a soft negative, should range from a quarter to half an hour, the difference depending on the colour of the prints and the quantity of the bichromated gum in the film.

Development.—After printing, the paper is immersed in a dish of pure cold water, which is changed every few minutes, until it ceases to show any trace of yellow caused by the bichromate in the coating. Once the bichromate has been eliminated, the further operations can be comfortably carried out in daylight. If, now, the exposure has been correct, the outlines of the image will soon show themselves at the points of greatest contrast, and the highest lights will appear in the cold water. Rock the tray for about five minutes, and then add a small quantity of tepid water of about 70° F., increasing the temperature from time to time till the image commences to appear. Now carefully lift the print on to a sheet of glass, cautiously avoiding contact with the surface, and, holding it over the basin, keep pouring water on the picture. If the exposure has been too short, development will soon be completed, but the image will be weak. Over-exposure, on the other hand, will cause the image to hold back, and in that case recourse may be had to the sawdust soup recommended by Artigue to bring out details. Finally, replace the print under water, and, by means of a soft and fine brush, remove the parts that offer the greatest resistance, clearing up the portions that appear too dark and eliminating useless detail. Proceed, however, with the utmost caution so as to avoid marks, and do not allow the passion for 'artistic' results to annihilate photographic excellence.

After Operations.—Development having been completed, the print is immersed in a ten per cent. alum solution, to remove the last traces of bichromate, and, after thorough washing in cold water, is dried. It should then be varnished with any good crystal varnish, as that gives depth and transparency to the colours, particularly to those, like umber and burnt sienna, that have a tendency to appear too deep.

Final Remarks.—Printing in clouds from a second negative is not possible unless, after development, the sky portion is resensitised, printed on, and redeveloped. By this second sensitising, however, effects in two colours may be produced. Certain authors recommend the use of soda and acids in development, but Kuhn is distinctly opposed to their use, as they diminish the intensity of the shadows.

HERR HUGO HENNEBERG gives the result of his experiences in the working of the process.

The conclusion to which Herr Henneberg has come is that, for the successful working of the process, the most important factor is the amount of gum which is laid on the paper, and he says that hitherto either too much or too little gum has been used, the coating has been too thin, it was printed too much, and the water used was too hot. He has found that prints which have only been exposed for a short time and developed in cool water, when a plentiful quantity of gum has been used, are much more 'piquant' and fresh than those with which a little gum was used and over-printing and hot water were employed.

His advice as regards the materials is, of course, based on Continenta forms, and it might be difficult therefore to obtain some of the materials which he suggests.

THE PAPER.

Well-sized paper is the best that can be used, and, of the smoother papers, those of Canson & Montgolfier, the drawing paper of Schleicher & Schüll

for coarser-grained papers, No. 751 of the latter firm and the water-colour paper of Johannot & Co., of Annonay are the best; the drawing papers, as used for platinotype printing, especially Whatman's paper, are totally unsuitable.

The Chemicals.

The solution of gum arabic should be forty per cent., its quality is not of the greatest importance; the solution of potassium bichromate should be absolutely saturated. When this process was first used, considerable importance was laid on the quality of the colouring matters, but Herr Henneberg finds that this has little effect; the water, paste, and tempera colours, powders, powdered drawing chalk, lamp-black, and many others may be used with equally good results. Herr Kühn recommends also fatty colours, soft Conté crayons, pastel colours, and especially drawing chalks. As a rule, a colour is better and gives softer prints the richer it is and the finer the powder. By comparative experiments, Henneberg states that the colours as generally used are absolutely unchanged in shade by the addition of the bichromate.

It is difficult to make exact statements as to the proportion of the three ingredients. For a sheet 50×60 cm. Henneberg uses $1\frac{1}{2}-2$ g. of colour, $6-8$ c. c. of gum solution, and this mixture is diluted according to the thickness of the coating with from 15 to 25 c. c. of solution of potassium bichromate. One tip, which may help as to the suitability of a paper and a proper quantity of gum, is the following: a piece of the dried and unexposed paper must part with the whole of its pigment, when laid in cold water for half an hour. If this is not the case, too little gum has been used. If a faint tinge of colour remains on the white unexposed edges or rebates of the prints, the paper is not suitable; it is too fibrous.

Spreading the Colour.

Of considerable importance and, next to the development, the most important factor, is the correct spreading of the colour, not so much as regards its regularity, but in respect to the tonality of the surface and the white paper. Obviously, if one considers as to what the final picture is to be as with the other processes, a correct coating is all-important, whilst with other processes the depth of the picture in the deepest shadows is dependent on the length of exposure, and therefore the greater or less decomposition, that is to say, the separation of more or less metal (silver or platinum); in the bichromated gum process the deepest shadows are determined beforehand. The whole character and tonality of a picture, whether one wants a vigorous, plucky picture with deep shadows, or one with soft gradation, depends, in this case, not on the character of the negative or the exposure, but solely on the original intensity of the colour on the paper. It is, therefore, says Henneberg, one of the requirements of a bichromated gum picture that exactly so much colour, and no more, should be spread on the paper as should be present in the deepest shadows of the picture, and therefore the amount of raw pigment spread on the paper must be proportioned in every case to the effect which it is desired to attain. Thus, if it is desired to print a vigorous, plucky landscape, such as a country scene, and a delicate head study, the same sheet of paper cannot be used, which is totally different to platinotype paper. In the deepest shadows the whole of the gum must become insoluble, and in development no colour should be dissolved away; if, however, excessive colour is present on the paper and in the deepest shadows, the development must be prolonged in order to remove the excessive colouring matter in the shadows, so that the high lights and half-tones may be washed away.

The peculiar peeling of the colour in development, which has frequently

been complained of, is, according to Henneberg, due to the thickness of the film rather than the quality of the colouring matter. It appears generally when too thick films are used or with under-exposure; that this flaking or peeling is more noticeable with brown films is due to the fact that these require the longest time to print. The thinner the film is, the more gum it will stand.

Printing.

From what has been said above, it will be seen that Herr Henneberg lays less stress upon the printing than is usual in other processes, and he considers that the method of development is more important, but considers that it is advisable to use an actinomter, especially when it is not possible to see the image. As a sign of correct printing, Henneberg considers that the high lights should be distinctly visible, without any adventitious aid, after half an hour's soaking in cold water; and he says that no aid to development should be used till all the chromium salts are washed out. If the high lights are visible only after the use of hot water or some other developing agent, the print was over-exposed. Under-exposure is recognised by the film dissolving too readily.

As a rule, thin and soft negatives are to be preferred, but this does not mean that good effects cannot be obtained sometimes from hard negatives; but it is important that the shadows of the negatives should be quite clear, as good results are never to be obtained from flat and foggy negatives.

Development.

The development Henneberg states to be the whole secret of the process, as by judicious use of various agents any effect desired can be obtained. He uses a common scent-spray diffuser, which is placed in an ordinary bottle. which is held in the left hand, whilst the right hand is used to operate the indiarubber bellows, which should be fitted with two indiarubber balls, so as to give a continuous stream of liquid. By bringing this into play at the correct moment, increasing or reducing the distance between the spray diffuser and the print, and the use of cold, lukewarm, or hot water, any effect can be obtained, and it is particularly suitable to clear up dark parts of the picture.

Combination Printing.

Henneberg's prints by this process in the last Salon were noticeable for the clouds, which he had obviously printed in, and he explains how this was done. He states that he discovered that, after one of these bichromated-gum prints had been developed and dried, it adhered very firmly to its support, and that therefore it could be again treated with hot water, brush, or spray, without suffering change. It is thus possible to develop a print and obtain a perfectly white sky, and to dry the same, and then coat it afresh with the pigmented gum and expose afresh under a cloud negative, and then to develop this till the desired result is obtained.

CARAMELENE FOR BACKING PLATES.

An interesting paper on this subject was read before the London and Provincial Photographic Association by Mr. Haddon, in the course of which he observed:—

If we refer to Watts's *Dictionary of Chemistry*, we find caramel, as usually prepared, to consist of three distinct substances: caramelane, caramelene, and caramelin. Caramelane is soluble in alcohol of 84 per cent. and in water. Caramelene is insoluble in alcohol of 84 per cent., but soluble in weaker spirits and also in water. Caramelin is insoluble in water and

alcohol, but soluble in weak spirit. These substances differ from each other, and from sugar only in that they contain less hydrogen and oxygen constitutionally. The sugar, by the application of heat up to about 190° C., is dehydrated to such an extent as to form the first substance, caramelane, soluble in alcohol of 84 per cent. and in water; if, now the temperature be raised to about 220° C., this body loses still more of the elements of water and is converted into caramelene.

Caramelane has but small colouring power, and besides is hygroscopic; caramelene, on the contrary, is very highly coloured, and possesses, it is said, six times the colouring power of caramelane, and is but slightly hygroscopic. When producing caramel for photographic purposes, we should aim at producing that variety which is as highly coloured as possible, and which absorbs the minimum of water from the air. It is for this reason that, in cooking the sugar, it is necessary to urge the temperature to such a degree as to convert as much as possible of the caramelane into caramelene, but at the same time avoiding such high temperatures as will produce the insoluble variety, caramelin.

In order to produce the caramel from which the caramelene is obtained, proceed as follows:—Place in a capacious stewpan, say, one pound of loaf sugar (moist sugar will not do), and rest the whole on a clear fire, or, better, on a gas stove. As soon as the sugar begins to melt, stir it with an iron spoon, and, till the cooking is complete, the stirring must be continued, or the sugar may be charred locally. Until the whole of the sugar is melted there will be no great rise in temperature and the volume will be small, but soon after complete fusion the temperature will begin to rise, and abundance of bubbles will be formed, so as to fill almost completely the stewpan, unless it be a very capacious one indeed. Judging roughly, I should say that the volume increases to five or six times that of the fused sugar. After a few minutes the frothing will gradually subside, and the effect of the continued heat will simply cause the mass to boil, but without any very considerable increase in volume. At this stage the caramel is very fluid, of a light red colour by transmitted light, and the bubbles rise easily to the surface. The temperature is now about 220° C., and this temperature should be maintained for about fifteen minutes; at the end of that time the fused mass begins to thicken, and the cooking should not be continued more than four or five minutes after this stage, as, if it is, there is danger of the whole mass being converted into the insoluble variety, and time and material will be wasted. It would be best, perhaps, for a beginner to operate on a smaller quantity of sugar as a first trial, so as to study the different changes, and, when a satisfactory sample can be produced, then to repeat the cooking on a larger scale.

As soon as the caramel has passed through the various stages, pour out the contents of the stewpan on a piece of cold metal or on a slab of slate or marble. If sheet metal is used, the caramel will be found, as it cools, to detach itself in pieces from the support. If the operation of cooking has been properly carried out, when cold it will be brittle and free from tackiness.

The caramel should now be broken into small pieces and placed in a wide-mouthed bottle, and sufficient water added to cover about one-third the height of the caramel. If the bottle be set aside for a few days, the solid will have dissolved, and we shall have a thick, treacly mass of caramel dissolved in water. This solution contains both caramelane and caramelin. The next operation is to separate the one from the other. As I have already stated, caramelane is soluble in alcohol of 84 per cent. (sp. gr. ·84); if, therefore, the aqueous solution be poured into strong alcohol, the caramelane will remain in solution, and the caramelin will be precipitated. Ordinary methylated alcohol, of sp. gr. ·820, will do quite well, and eight to ten times the volume of the syrup should be used in order to effect the separation. If the alcohol is of the

proper strength, the alcoholic solution ought not to be very deeply coloured, and a large, soft lump of caramelene should be found at the bottom of the precipitating vessel at the end of about an hour. When the solution is first mixed with the alcohol, it becomes of a brownish colour, due to the precipitation of the insoluble caramelene.

After draining off the supernatant liquor, water is added in sufficient quantity to form a tolerably fluid mixture. If this be used by itself to back plates, it will frequently be found on drying to flake off the glass. This defect can be avoided by adding from one-eighth to one-tenth volume of the original caramel solution. In this way a mixture is obtained which will both dry hard and remain firmly attached to the plate when dry.

In order to apply it to the plates, pour a small quantity into a saucer, and then allow a piece of absorbent wool to become partly saturated with it, and pass the wool over the backs of the plates till they are evenly coated. Only a thin coating is required for ordinary work; but, if a difficult subject is to be photographed, then it is better to apply the caramel with a brush, so as to leave a thicker layer on the plate.

So as to cause the caramel to dry quickly on the backs of the plates, instead of dissolving the caramelene in plain water, dissolve it in spirit and water, in the proportion of one of the former to three of the latter. Caramel thus prepared will dry, when the thickness is not excessive, in about thirty minutes.

The methylated spirit, as now sold, is not the most suitable for the precipitation, as, in consequence of the oil separating on dilution, the film dries with some patches more or less bare, caused by the repellent action of the oil. The old methylated spirit, however, does not produce this effect.

Some workers recommend the addition of burnt sienna or other insoluble body to the caramel; but this, I think, is a mistake. If plain caramel is used, the plate can be transferred direct to the developing solution, and without any danger of pinholes being formed, due to particles of insoluble matter adhering to the film, and so preventing the full action of the developer. The solution of the caramel in the developer has no detrimental action on the image.

The colour of caramelene is very non-actinic, so that, if at any time I could not obtain glass or other material with which to filter white light for development, I should not hesitate to trust to the light which comes through paper or linen coated with caramel.

BAS-RELIEF PHOTOGRAPHY.

MARTIN'S METHOD.

THIS method is described by the inventor in the following terms: He first makes a negative in the usual way. On the film side, and near the corners of this negative, he attaches wafers of opaque paper cut out by means of a steel punch. The wafers are placed as far away as practicable from the centre of the picture, in order that they may be out of the way, and covered when the picture is mounted. The back of a sheet of sensitised paper, preferably that known as rapid bromide, is placed in contact with the negative in a printing frame, and a reversed image of the picture obtained by exposure in the usual way. Images of the wafers will appear with the image of the picture. The reversed image thus obtained is mounted upon a block or piece of wood about half an inch in thickness. When dry, the outline of that part of the figure which it is desired to emboss is carefully traced over with a lead pencil, and the block is then pierced through with a fret-saw, following such pencil lines, thus leaving a perforation, the boundary of which will coincide with the outline of the figure. A finished positive print is now made from the negative, and

mounted upon thin sheet brass, copper, zinc, or other ductile material, and, when dry, the portions covered by the images of the wafers are cut out by the steel punch. This perforated positive picture is then laid face downwards upon the reversed image, or such parts of the reversed image as are left upon the pierced block, care being taken that the perforations exactly correspond with the images of the wafers on the block.

A pad of thick sheet indiarubber or wadding is now placed upon the metal backing of the positive picture, and the whole subjected to pressure under a press; an ordinary copying press is admirably suitable for the purpose.

On removing the picture from the press, it will be found that the parts extending over the perforation in the block have been pressed forwards in the perforation, and have assumed a pleasing general bas-relief effect.

To model the more delicate details, the picture still in contact with the pierced block is placed in a vice, or otherwise held firmly, to leave the artist's hands at liberty to work on either or both sides of the picture, and so that he may gently depress from the front such parts as are required, and press forward from the back such other parts as he may desire. For this work pencils, preferably of soft wood shaped to suit the requirements, may be employed; but, f the fingers are used, soft leather or kid gloves, or finger stalls, should be worn, in order that the picture may not be marked.

If thought desirable, the indented portion at the back of the picture may be filled with plaster of Paris, or the like, to render it solid, but this is not necessary when the picture is to be protected under glass in a frame.

TABER'S METHOD.

Fig. 1 is a view of a photographic negative with guide or register marks thereon.

Fig. 2 is a back view of the block with the embossing mould and register marks.

Fig. 3 is a view of the photograph with the register marks cut out.

Fig. 4 is a view of the mould with guide or register bars attached thereto.

Mr. Taber states that the usual manner in which he carries on this process is to provide on the negative, shown in fig. 1, the guide or register marks, R R, which may be produced by pasting on the negative strips of paper, or painting the same on the negative with any suitable material, so that they will show upon the sensitised paper on which the prints or photographs are made. The surface of the block to be used as a mould is sensitised, and the reverse of the negative, A, is printed thereon, shown in fig. 2, and marked B, where the picture to be embossed is shown on its surface with the guide or register marks, R R. The embossing mould is now made in accordance with the picture on the block by hand engraving, or any appropriate means to such depth and to such degree of nicety of detail as may be desired. A photograph from the negative, A, is now made, and the same is trimmed so as to bring the register marks, R R, at the edge of the sheet. The photograph C, with the register marks thus trimmed, is placed on the embossing mould so that the register marks of C and the register marks of B will correspond. The photograph C is then fastened to the block D by any appropriate means so that it will retain its position on the block with the figure of the photograph directly coincident with the figure of the embossing mould. The photograph sheet, having preferably been moistened to soften it, a backing of soft and elastic material, such as rubber sponge, is applied to the back of the photograph, and the whole is subjected to pressure, whereby the rubber sponge forces the photograph into conformity with the embossing mould, giving to the surface of the photograph the contour of the mould. If desired, the face of the block B may be provided with guide bars or frame, as shown at D in fig. 4, where they are put on in accordance with the guide or register marks. When a frame of this

Fig. 1.



Fig. 2.



Fig. 3



Fig. 4.



character is used on the face of the mould block, the photographs to be moulded should be trimmed in accordance with the register marks on them, which will make the edges of the photograph prints correspond with the frame D on the mould block, causing the photograph of the figures to correspond with the mould when they are in the frame D.

Good results may be obtained by drawing the outlines to be moulded for a photograph, as shown in fig. 1, on a piece of transparent paper or other like material placed over the same, and transferring the outline thus made to the block B by placing on the block B a piece of carbon paper, and placing over that the tracing of the photograph face down, when, by following the outlines on the tracing paper with a pencil or like instrument, the lines will be transferred to the block through the medium of the carbon paper placed thereon, the guide marks, R R, being preferably placed on the block at the same time.

One of the advantages of this way of carrying on the invention is that it may be applied to any photograph without the necessity of having the negative, or more than one copy of the photograph to make a proper mould to emboss the photograph.

It is manifest that, instead of placing a guide or register mark on the negative, the edge of the negative may be used as the guide or register mark, and be shown on the photograph and on the block in which the mould is made, and serve as a register mark without departing from the nature of my invention.

MARCEAU'S METHOD.

Fig. 1 is a view showing the manner of outlining the picture upon the surface in which the corresponding intaglio is to be produced.

Fig. 2 is a view showing the means for registering the pictures which are to be afterwards thrown up into relief.

Fig. 3 is a vertical section through the mould.

Mr. Marceau first prepares a photographic negative in the usual manner. The pictures are then taken from the negative upon films of sensitised paper, and the outline of those portions which it is designed to show in relief is cut out from one of these sheets, and pasted upon a surface of glass as shown at A.

The paper upon which the pictures are taken is all cut of a certain size, and the negative is marked, so that this paper is always laid in the same position upon the negative for printing each picture. The pictures are therefore all in identically the same relative position upon the paper, and they all correspond with the one from which the outline was cut for the purpose of making the intaglio block.

The exterior portion of the paper from which the outline has been cut now serves as a pattern for the exact registry of each of the pictures which are to be thrown up into relief, and is afterwards used for this purpose, as will be hereafter more fully explained.

The surface, A, upon which the figure is pasted, as previously described, forms one side of a mould, the space between the two sides being sufficient to provide a necessary thickness, and the sides being also connected by edge strips so as to form an enclosure, as shown in fig. 1.

Into this enclosure he pours plaster of Paris or other plastic material which will afterwards set and become hard, filling the space within the mould.

The plastic material flows around the figure which has been pasted upon the glass, and this figure, projecting the thickness of the paper above the surface of the glass, will form a corresponding indentation in the material with which the mould is filled, and which indentation remains after it has set.

The mould is then opened, and the hardened material is taken out, the outline or figure is removed from the face of the plaster if it has adhered thereto, and the perfect outline remains upon the surface.

The surface of the block is now excavated or engraved out in the usual

Fig 1.

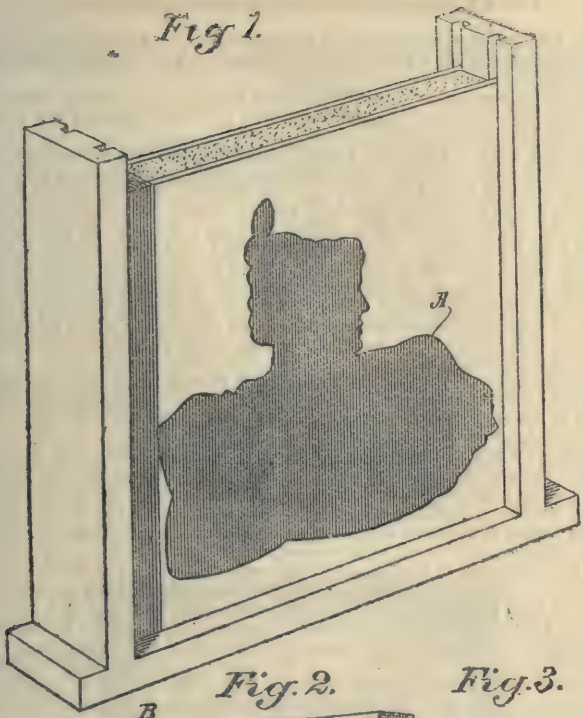
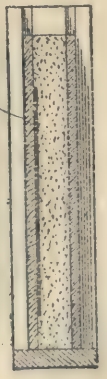


Fig. 2.



Fig. 3.



manner for producing intaglios, so as to form the various features of the picture to greater or less depth, as the shade or contour of the picture demands and the taste of the artist shows to be proper.

When this is completed, it is in readiness to receive the pictures which are to be thrown up into a relief corresponding with the depth of the intaglio which has thus been formed.

The part, B, from which the figure was cut to form the outline upon the block, is now pasted, or otherwise attached, to the block, forming an accurate peripheral outline around the intaglio, and, as all the pictures are in exactly the same relative position upon the printed sheets, it is only necessary to register the edges of each sheet with that upon the block, to register each picture with the intaglio. The picture is wetted, and then pressed into the block by any of the usual or well-known means for producing raised surfaces, and those parts of the picture which are designed to be thrown up into relief will be correspondingly forced into the various depressions of the intaglio in the block, remaining there under pressure until dried, after which they can be removed, and the pictures mounted in any usual or well-known style for mounting such pictures.

If preferred, any suitably prepared block may be used, and the outline within which the engraving or intaglio is to be made may be marked upon the surface of the block, by laying the cut-out figure thereon and outlining it, and afterwards engraving the block.

A convenient method for effecting this is to lay the picture to be produced in relief upon a supplemental sheet, which is properly proportioned to the block, and then to cut the outline of the picture, and at the same time cut through the supplemental sheet beneath, the two sheets being secured together so as to remain in the same relative position until the cut has been completed.

The supplemental sheet may be made of any suitable material. He has found that collodion in thin sheets makes a very satisfactory substance for the purpose, but it will be manifest that other materials may be used without departing from my invention. This supplemental sheet is then laid upon the block, to which it is temporarily fixed by pins or clamps, and the outline which is to be engraved in the block is marked by following the outline of the cut. The sheet may then be removed and the engraving of the block completed. The pictures to be thrown into relief are then fitted to the opening in the supplemental sheet, and the picture and sheet are placed upon the block, the face of the picture coinciding with the intaglio which has been cut in the block, as in fig. 2.

This registration is ensured by passing pins through the holes already made in the supplemental sheet and through the picture, these pins entering the holes previously made in the block, and after this is effected the pressure is applied to throw the picture up into relief by pressing the parts of it into the intaglio in the block.

ROCKWOOD'S METHOD.

A PREREQUISITE for making bas-relief portraits is a hinged double frame as shown in fig. 1. This, which may be called a modelling frame, is all the 'plant' essential to the process, and is an inexpensive affair. The opening for the smaller-size picture should be the size of a trimmed cabinet print; for an 8×10 print the opening should be 7×9. Having the frame, we proceed as follows: 1. Make a brilliant platinum print, preferably from a profile negative lighted *à la* Rembrandt. Now, on a sheet of very transparent paper, such as the paraffin preservers used to protect cabinet pictures, make a careful tracing of the outline and principal features of the print with a *soft* pencil. 2. Mount the platinum print on thick white blotting-paper with Higgins's mountant (this seems to be a mixture of glue and starch, and is admirable for the purpose set forth). Smooth the print down gently into contact, with a roller if you have

one, and then lay it aside under pressure until it is required, a few minutes later. The dampness thus permeates the absorbent base and print, giving both

FIG. 1.

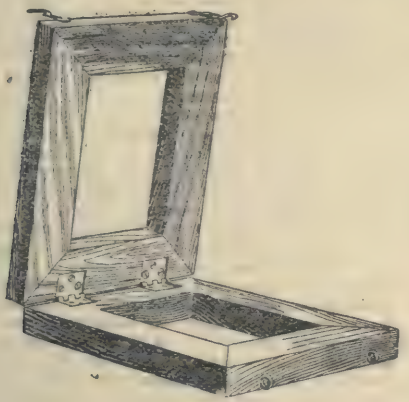


FIG. 2.



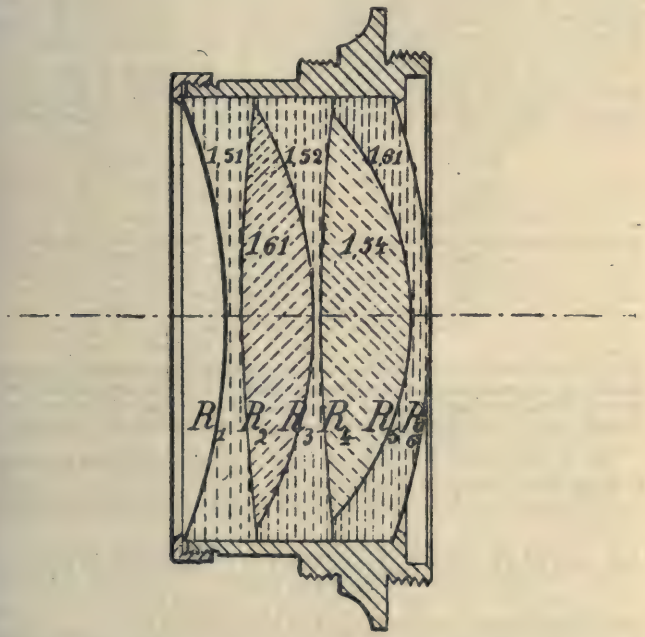
the plasticity required for the next operation. 8. Trim a piece of cardboard to the outside of the modelling frame. Place the tracing, face down, carefully

upon this cardboard, and, with the handle of a toothbrush, or the thumb nail, make a 'set-off' from the tracing on the cardboard. If the 'set-off' or transferred outline is weak, strengthen it with a few strokes of the pencil. 4. Insert the sharp point of a pair of scissors just inside the outline on the card, and very carefully cut out the design close to the pencil lines. The more accurately this is done the better will be the final results (fig. 2). 5. Having made a good 'cut-out,' place it on the face of the mounted print, which is now in proper condition for use, and carefully register the 'cut-out' to the outlines of the subject on the print. If the print has expanded, cut the card away, preferably at the back of the head of the subject, until the 'cut-out' and outlines exactly register. Now place both mounted print and cardboard 'cut-out' in the modelling frame (fig. 1), and securely fasten the frame by the clasps at the ends. 6. With the handle of a toothbrush, or any similar smoothly blunt burnishing tool, begin to rub and press the print from the back, following the outlines of the 'cut-out' and working up the relief desired with care. The dampened print, being quite pliable, responds to every touch. This part of the work is, of course, done with the right hand, the left hand holding the frame to the table and the thumb following the working of the burnishing tool to keep the edge of the 'cut-out' close down to the print, as the dampness of the latter will cause the card to cockle and spring up, thus injuring the sharpness of the outline. When the outlines have been raised to the degree of relief desired, the inside features may be similarly and more freely treated. These may be relieved to about a quarter of an inch. A little experience will enable the photographer to easily and accurately accentuate the light draperies and hold back unimportant details. The relief so gained will remain, and, owing to the paste used, will stiffen, and prevent any crushing of the picture unless severely handled.

A NEW GOERZ LENS.

THIS consists (as shown in the drawing which illustrates an axial section) of a series of five lenses united together, which must possess certain special qualities in order that the object in view may be attained as fully as possible. The figures 1, 51; 1, 61; 1, 52; 1, 54; and 1, 61, attached to the figure, denote the indices of refraction of the glass used for separate lenses in round numbers. In order to obtain the greatest possible strength of light, it is proved to be necessary that at the first refracting concave surface, R_1, as small a refraction (1, 51) as possible should take place, whilst at the last convex surface, R_8, on the other hand, as high (1, 61) a refraction as possible should be present. Furthermore, the first lens must be biconcave, so that at the second refracting surface, R_2, there will be a cementing surface acting as a collector of the light and compensating for the astigmatic aberration; and in order that this surface be as flat as possible, which is desirable to prevent curving of the image, it is necessary that at this second refracting surface as large as possible a difference between the refractive indices of the material of the first and second lens be present, that is, that the second lens be constructed of a glass of high refraction. The second lens must be a biconvex one, and to this must be applied a negative lens of low refractive index, so that at the third refracting surface, R_3, a cementing surface, acting as a light collector, opposed to the second one, may be formed, which, without increasing the astigmatism, exercises a compensating influence upon the distortion which is the product of the other surfaces, so that, by a right choice of the curvature of the surface, R_8, the distortion for a main ray falling sideways will be completely neutralised. For the compensation of the spherical divergence the surface, R_5, is arranged; at this point there must not occur a difference in refractive index much greater than 1, 61; 1, 54; 0, 07, because it must have an exactly fixed depth, which is determined by the direction of the principal

rays which must encounter it under as small a refractive angle as possible, because here, otherwise, the distortion influences would be collected which can no longer be compensated by the surface, R_3. From this condition, and from the condition already set forth, namely, that the last lens must be constructed of as highly a refractive material as possible, it becomes necessary to insert between the lens 3 and the lens 5 a further positive lens of medium refraction. This lens 4 can be either biconvex or concavo-convex, according as the surface, R_4 receives a positive or a negative curvature. As at this surface, on accoun



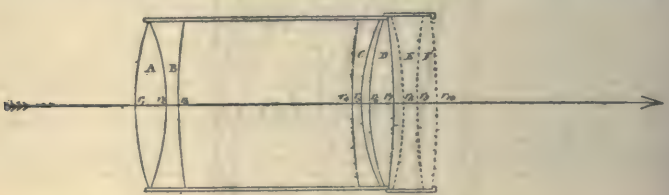
of the very slight difference of refractive index (about 0, 02), the errors of distortion and spherical divergence are very little influenced. The lens may be principally devoted to the complete removal of the chromatic divergence. With the increase of the number of lenses in compound cementing systems, increases, of course, the difficulty of bringing the lenses into the combination in exactly central position, and of maintaining the same permanently in this position. In order to meet this difficulty, Messrs. Goerz and Von Hoegh have arranged in their five-lens system that the negative lenses possess a greater diameter than the positive lenses enclosed by them, and that the said negative lenses come in contact by means of their projecting exactly centered edges. They consequently enclose completely the positive lenses, which can henceforth only have one position that is, the exactly correct position in the system.

THE ASTIGMATIC CORRECTOR.

In older types of lenses, especially portrait lenses, in which the character of the glasses employed necessitated a higher dispersive power to accompany a higher refractive index (a condition no longer necessarily existing since the invention of the Jena glasses), flatness of field always involved astigmatic aberration; or, if the astigmatic error was practically eliminated, the curvature of field was considerable. The construction of the best forms of the older types has been the most skilful compromise between these errors.

Mr. T. R. Dallmeyer remedies this defect by an astigmatic corrector, which eliminates the residual errors (of astigmatism and curvature of field) of the older forms of positive lenses, largely increasing their covering power at the expense of an inconsiderable lengthening of the focus.

For this purpose he places behind any particular form of the old types of lenses, after having determined the residual errors referred to, his astigmatic corrector, which is calculated to eliminate these errors. The form necessary to



do this in the case of Petzval's construction consists of a negative combination consisting of a double concave lens, cemented to a double convex lens of greater dispersive material and higher refractive index. This reversal of material applies in every case, but the shapes of the lenses may be varied for some of the older types of lenses.

The drawing shows the invention applied to the well-known Petzval lens made up of four lenses—A, B, C, and D.

The lenses, E and F, shown in dotted lines, form the astigmatic corrector.

AN OPTICAL DEVICE FOR THE INTENSIFICATION OF NEGATIVES.

This device is due to Lord Rayleigh, who thus describes it:—

Whether from insufficient exposure or from other causes, it not unfrequently happens that a photographic negative is deficient in density, the ratio of light transmissions for the transparent and opaque parts being too low for effective contrast. In many cases an adequate remedy is found in chemical processes of intensification, but modern gelatine plates do not always lend themselves well to this treatment.

The method now proposed may be described as one of using the negative twice over. Many years ago a pleasing style of portrait was current dependent upon a similar principle. A thin positive transparency is developed upon a collodion plate by acid pyrogallol. Viewed in the ordinary way by holding up to the light, the picture is altogether too faint; but, when the film side is placed in contact with paper and the combination viewed by reflected light, the contrast is sufficient. Through the transparent parts the paper is seen with but little loss of brilliancy, while the opaque parts act, as it were, twice over,

once before the light reaches the paper, and again after reflection on its way to the eye. For this purpose it is necessary that the deposit, constituting the more opaque parts of the picture, be of such a degree as not itself to reflect light back to the eye in appreciable degree—a condition very far from being satisfied by ordinary gelatine negatives. But, by a modification of the process, the objection may be met without much difficulty.

To obtain an intensified copy (positive) of a feeble negative, a small source of illumination, *e.g.*, a candle, is employed, and it is placed just alongside of the copying lens. The white paper is replaced by a flat polished reflector, and the film side of the negative is brought into close contact with it. On the other side of the negative and pretty close to it is a field, or condensing, lens of such power that the light from the candle is made parallel by it. After reflection, the light again traverses the lens and forms an image of the candle centered upon the photographic copying lens. The condenser must be large enough to include the picture, and must be free from dirt and scratches; otherwise it does not need to be of good optical quality. If the positive is to preserve the original scale, the focal length of the condenser must be about twice that of the copying lens.

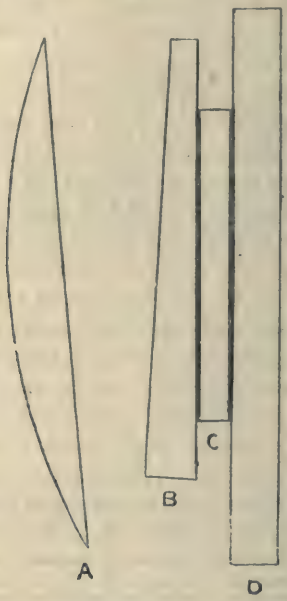
In carrying this method into execution there are two points which require special attention. The first is the elimination of false light reflected from the optical surfaces employed. As regards the condensing lens, the difficulty is easily met by giving it a moderate slope. But the light reflected from the glass face of the negative to be copied is less easily dealt with. If allowed to remain, it gives a uniform illumination over the whole field, which, in many cases, would go far to neutralise the advantages otherwise obtainable by the method. The difficulty arises from the parallelism of the two surfaces of the negative, and is obviated by using for the support of the film a glass whose faces are inclined. The false light can then be thrown to one side and rendered inoperative. In practice it suffices to bring into contact with the negative (taken as usual upon a parallel plate) a wedge-shaped glass of equal or greater area, the reflection from the adjoining faces being almost destroyed by the interposition of a layer of turpentine. By these devices the false light is practically eliminated, and none reaches the sensitive film but what has twice traversed the original negative.

The other point requiring attention is to secure adequate superposition of the negative and its image in the associated reflector. On account of the slight lateral interval between the copying lens and the source of light, the incidence of the rays upon the reflector is not accurately perpendicular, and thus any imperfection of contact between the negative film and the reflector leads to a displacement prejudicial to definition. The linear displacement is evidently $2t \sin \theta$, if t denote the interval between the surfaces and θ the angle of incidence, and it can be calculated in any particular case It is the necessity for a small t that imposes the uses of a speculum as a reflector. In practice 2θ can easily be reduced to $\frac{1}{12}$; so that, if t were $\frac{1}{50}$ inch, the displacement would not exceed $\frac{1}{600}$ inch, and for most purposes might be disregarded.* The obliquity θ could be got rid of altogether by introducing the light with the aid of a parallel glass reflector placed at 45°; but this complication is hardly to be recommended.

The scale of the apparatus depends, of course, upon the size of the negative to be copied. In my own experiments quarter-plates ($4\frac{1}{4} \times 3\frac{1}{4}$) were employed. The condenser is of plate glass, 6 inches diameter and 36 inches focus. The reflector is of silver deposited on glass. The wedge-shape glass attached to the negative with turpentine is 4×4 inches, and the angle between the faces is 2°. The photographic lens is of 3-inch aperture and about 18-inch principal focus. It stands at about 36 inches from the negative to be copied.

* If the glass of the negative were flat, its approximation to the reflector might be much closer than here supposed.

The accompanying sketch shows the disposition of some of the parts. It represents a section by a horizontal plane. A is the condensing lens, B the



wedge, C the negative temporarily cemented to B by fluid turpentine, D the speculum.

PHOTOGRAPHY IN NATURAL COLOURS.

M. DE SAINT-FLORENT'S PROCESS.

Ever since 1873, M. de Saint-Florent has been experimenting with the production of photographs in natural colours upon paper, and he has described before the Société Française his last process, in which he has used the ordinary celloidin paper of commerce. The paper should be exposed to sunlight for from 80 to 100 seconds, till it has assumed a reddish-black colour, and then immersed for ten minutes in a bath composed of—

Alcohol (36°)	100 c. c.
Glycerine	7 grammes.
Tincture of iodine (one per cent)	7 ,,
Strong ammonia	6 drops.

The alcohol may be the ordinary methylated spirit. The paper should be dried in the dark, and then exposed under a coloured transparency till the colours appear, which requires about an hour in the sun, and it should then

be fixed in a six or ten per cent. solution of hyposulphite of soda. In this bath the colours show up very brilliant, and then pale to a lemon-yellow, when the print should be rapidly washed and dried in the sun. The colours will then be revived with all their intensity. If there is no sun, then the print should be surface-dry, and placed in front of a bright fire. It is stated that the colours are permanent.

GRABY'S PROCESS.

M. Graby, in a paper contributed to the Académie des Sciences, also described a process by which he states that permanent results are obtained. The paper may be exposed wet or dry, and it is practically a modification of Veress' and Kopp's process, suggested by them in 1890 and 1891. Kopp used a mixture of zinc chloride and sulphuric acid to form the subchloride of silver, and then bathed the paper in a mixture of potassium bichromate, cupric sulphate, and mercurous nitrate, and fixed the colours by using a dilute sulphuric acid bath. Graby exposes gelatino-chloride paper to light till it is violet, and then immerses it in a four per cent. solution of hydrochloric acid, and dries it in the light, and then immerses in a one per cent. solution of potassium bichromate, dries it, and exposes to light till the gelatine has become quite insoluble, and then it is sensitised in a bath composed of—

Water	70	c. c.
Nitric acid	5	drops.
Mercuric nitrate	2	c. c.
Hydrochloric acid	3	,,
Sulphuric acid	1	,,
Chromic acid	1·5	grammes.
Soda alum	3	,

This paper is exposed damp, and gives good resultss. To expose the paper dry, it is first exposed till violet, then immersed in the acid bath in daylight till blue, then in the bichromate bath, then in a bath of nitrate of mercury, and dried and exposed, and after exposure, immersed in a bath of acetate of lead, and, finally, transferred to a sheet of paper exactly like carbon tissue and finally passed through a bath of salt and mercuric chloride. M. Graby states that red and blue are due entirely to the subchloride of silver, and can be seen by transmitted as well as reflected light at any angle, and, as he calls them, the chemical colours are similar to the colouring matters of flowers. A piece of silver exposed to the vapour of chlorine in the dark becomes first yellow, then red, and then blue, in proportion to the amount of chlorine that it absorbs, and, if this blue chloride be exposed to light, it will turn first red and then yellowish-white in proportion to the loss of chlorine. Silver chloride by itself will give only a dirty yellow, but a mixture of a chromate and silver subchloride will give a golden yellow complementary to the blue violet, and this is reduced by light to all shades of yellow. The yellow is thus, it is said, composed of chromic acid or a chromate, and, on being washed with acetate of lead, is converted into insoluble lead chromate. Blue and red being due to a definite amount of chlorine combined with the silver, it only remains to ensure this, which is done by the mercuric chloride for these colours to be fixed. White was the most difficult colour to fix; but, as this was formed by the bleaching of the blue silver chloride, or, in fact, by the disassociation of the chlorine and silver, and chlorine rendered soluble, the gelatine rendered insoluble by the action of light on the bichromate, it was quite sufficient to treat the paper like carbon tissue to obtain pure whites.

DITMAR'S PROCESS.

HERR VON DITMAR has discovered a new process of producing coloured pictures, and some were recently shown at the Trierer Exhibition. They are positives on glass, with a kind of coloured shimmer; red is the only colour which cannot be obtained. The discoverer does not claim that he has discovered any complete or practical process, but publishes the details in order that others may experiment. To prepare the plates, 350 parts of wood spirit, 30 parts of fuchsine, and 8 parts of thymol are intimately mixed and well boiled for a long time, and filtered hot three or four times. The mixture is coated, whilst hot, on the warmed glass, dried, and then heated till the film is no longer sticky. The plate has then a mirror-like surface, and will keep for a month. It has to be exposed under a coloured transparency in the sun. Even after a few minutes, a picture can be developed, but the best result is only obtained after some hours. Development is effected in cold water, which should be slightly acidified in order to set free the oxidising substances in the film. Development should be continued till all details are out, but not till all the the colour has been washed out. The plate is then placed in a half per cent. solution of caustic potash till the black drawing begins to turn a gold colour. It is then dipped into eau-de-javelle or chlorine water, and then removed and exposed to the air till the image turns brown. This last operation may be repeated till the desired colours are obtained. The plate should then be washed with water and dried over a flame. The result depends to a great extent upon the duration of the action of the baths; every kind of fuchsine is not suitable, the best seems to be one that can be bleached with chlorine. Herr Precht, of Heidelberg, points out that fuchsine appears to be one of the substances which have been classed by Otto Wiener as capable of colour absorption under coloured images.

INTENSIFICATION BY MEANS OF FERROUS OXALATE.

IN a communication to the Croydon Camera Club, Mr. F. P. Wratten pointed out that this method of intensification is, theoretically, the most perfect, inasmuch as, if properly carried out, the resulting negative image consists of metallic mercury and metallic silver, the whole of the silver of the image being left in the film. However, like most theoretically perfect processes, it needs to be carefully carried out, or stains will inevitably result. This is, in one way, an advantage, inasmuch as, if a negative be intensified by this method, and present no stains when it is finally dried, it may be relied upon to be permanent; whereas, by other methods of mercurial intensification, the operation may to all appearance have been successfully carried out, but, on keeping, stains will gradually make their appearance, and, it may be, a valuable negative will be seen to gradually perish before the owner's eyes.

The ferrous-oxalate method of intensification may be carried out in diffused daylight. If sufficient density is not obtained, the process may be repeated to any required extent.

In the first place, all hypo must be carefully removed by thorough washing. If this has not been done, the hypo should be decomposed by the application of a bath of alum, or, better, a dilute solution (1:200) of hydrochloric acid. Then thoroughly wash and immerse in a saturated solution of corrosive sublimate, to each ounce of which a drop of strong hydrochloric acid has been added, till the image is bleached. Then wash for twenty minutes in running water, rinse with distilled water, and soak in the same for five minutes. The treatment with distilled water is necessary, as the lime in the top water would otherwise cause markings. Immerse the bleached and washed negative in a

solution of ferrous oxalate, prepared by adding one part saturated solution of ferrous sulphate to four parts saturated solution of potassium oxalate. The image will now gradually blacken. When this blackening has extended to the back of the film, pour off the solution of ferrous oxalate, soak in distilled water for six minutes with three changes, and finally wash well. If distilled water has not been employed, it is necessary to soak the plate after washing in a one per cent. solution of hydrochloric acid for a few minutes, to remove the oxalate of lime deposit, then rinse well and set up to dry.

THE WASHING OF GELATINE FILMS.

J. GAEDICKE, in Eder's *Jahrbuch*, points out that the diffusion of hyposulphite of soda through gelatine membranes is of special interest to photographers, and an accurate investigation of the subject was made, which confirmed the work of Messrs. Haddon and Grundy.

Three questions were investigated.

1. In what quantities does sodium hyposulphite diffuse through a gelatine membrane into water—(*a*) with various strengths of solution; (*b*) with an upward diffusion; (*c*) with a downward stream?

2. How does a solution of hypo diffuse through a gelatine membrane into solution of common salt?

3. Does gelatine take up the hypo solution in different strengths?

The diffusion apparatus consisted of a strong glass tube of 8·75 mm. internal diameter, and this was covered at one end with a sheet of gelatine swollen in water, of a thickness of 3·27 mm., which is about four times as thick as the film of a dry plate. The hypo was quantitatively estimated by a titrated iodine solution, and a two per cent. solution of arrowroot starch as indicator. A twenty per cent. solution of hypo was made, and this diluted as required. The temperature of the laboratory was kept constant at 17·5° C.

The first series of experiments were made by placing the hypo in the outer vessel, and the diffusion tube suspended in this, and filled with distilled water to the same level as the solution in the outer beaker. It was found that during the hour no hypo had diffused into the inner vessel, which was ascribed to the fact that the gelatine had not become saturated with hypo, and therefore in all the experiments the first hour was ignored.

Experiment I.—In the outer vessel a two per cent. solution of hypo was placed, and the inner diffusion vessel filled to the same level with distilled water, so that the hypo would diffuse up through the gelatine. In thirty-six minutes 0·001 gramme of hypo was found in the inner vessel, in an hour 0·002 grammes. In fifteen hours 0·006 grammes of hypo diffused, not fifteen times as much, but only three times as much. When allowed to stand undisturbed, it is thus seen that the diffusion is very slow, and a film of hypo solution of the same strength as in the outer vessels rests on the film and prevents further diffusion. In order to prove this, the inner vessel was emptied every five minutes for half an hour, and the six waters contained 0·003 gramme of hypo, in fact, three times as much as in the previous thirty-six minutes, and half as much again as in an hour when the water was not changed.

Precisely similar conditions would occur when fixing a plate in a dish. Diffusion would take place immediately, and above the gelatine would be a layer of hypo solution, which would stop further diffusion.

Experiment II.—The above experiment was repeated, using a five per cent. solution of hypo. At the end of the first hour 0·003 gramme of hypo, and in the second and third hour 0·004 gramme, diffused, or double as much as in the weaker solution.

Experiment III.—When a ten per cent. solution of hypo was used, 0·007 gramme diffused in the second and third hours.

Experiment IV.—When a twenty per cent. solution was used, in the second, third, and fourth hours 0·008 gramme diffused, whilst in the fifth hour, if the water in the inner vessel was stirred, 0·010 gramme diffused.

From these experiments it is evident that the quantity of salt which diffuses in a given time is greater the more concentrated the solution is, but the increase is not proportional to the increase of concentration of the solution. The advantages of keeping the water moving is shown from Experiment IV.

To test the diffusive power of hypo downwards, the following experiments were made with the hypo solution in the inner vessel, and the water in the outer.

Experiment V.—A twenty per cent. solution was used, and in an hour 0·017 gramme had diffused. In fourteen hours 0·167 gramme diffused, corresponding to an hourly diffusion of 0·012 gramme, which proved that gradually the diffusion decreased, which was due to the difference in strength of the two solutions becoming more equal. This proves that for washing plates it is not advantageous to allow the plate to remain in the one water too ong.

Experiment VI.—This was to determine the diffusion of hypo in concentrated solution of common salt, and it was exactly on the same lines as No. V., only that concentrated solution of salt was placed in the outer vessel. It was found that there was a noteworthy increase in the diffusion; in the first hour there was 0·015 gramme, in the second 0·012, and in the third 0·009 gramme diffused. The decrease in the rate of diffusion was found to be due to a layer of the lighter hypo solution lying underneath the gelatine, and thus preventing the further diffusion.

Further experiments with the solution of salt were made, and the conclusions arrived at are that a plate can be more readily washed, film up, in a solution of salt than in water, as the lighter hypo rises and gives place to fresh salt water. From Experiment V. it is obvious that plates will wash much more quickly if placed film downwards or upright, as in both cases the diffused hypo sinks to the bottom of the vessel and makes room for fresh water.

In order to decide whether the gelatine film took up a definite quantity of hypo, or whether the quality changed with the concentration of the solution, several experiments were made, but without very conclusive results.

Herr Gaedicke deduces the following conclusions from his experiments:—

1. The quantity of hypo which diffuses in a given time is greater the more concentrated the solution; but the two are not proportional, the diffusion increasing more slowly.

2. The diffusion upwards, which is but little, is considerably slowed as time goes on when the water is not kept in motion, in that the heavier layers rest on the membrane and only slowly diffuse.

3. When the diffusion is upwards, it is greater where the water is kept in motion.

4. When the water is changed every five minutes, three times as much hypo are extracted as when it is changed every half hour.

5. When the plate is placed face downwards or upright in the water, the quantity of hypo eliminated is about double that when the film is placed upwards.

6. It is not advantageous to leave a plate in the same water too long.

7. In a concentrated solution of common salt, the hypo diffuses upwards and therefore a better washing takes place with the film up.

8. Gelatine takes up the solution of hypo in one concentration.

THE ENAMEL PROCESS ON ZINC.

[Translated from the Photographische Correspondenz.]

After the American enamel process had become so deservedly popular, and had been worked out by experts upon copper in its various modifications (fish glue, Cologne glue,* metagelatine† &c), attempts were soon made from many sides to adapt the process to the cheaper metal, zinc.

The difficulties standing in the way of the process upon zinc were to be found principally in the fact, that the structure changed and became crystalline at the temperature necessary for burning in the glue picture, and consequently good results were not attainable with the usual etching processes. To avoid this difficulty, it was necessary to produce a film of enamel upon zinc at a lower temperature, or to find a modified etching process that would properly etch the zinc in its altered condition. A number of attempts were made in both directions.

In addition to the published enamel processes, the so-called cold-enamel processes were offered for sale from various quarters; but, notwithstanding their extravagant advertisement, they were not adopted permanently in practice, as it is impossible to attain the resisting power of the burnt-in enamel by any cold process.

The first publications relating to the enamel process upon zinc and its difficulties were by Wilkinson, in 1893,‡, and W. Sicker in 1894,§

Husnik,‖ recommended a primary etching of the zinc with—

Nitric acid	1 part.
Alum	1 ,,
Water	20 parts.

The plate was then prepared as usual with bichromated glue, the image stained with an alcoholic solution of dye, and etched after burning in.

Another proposal was to pour a stained solution of shellac (in chloroform and benzole) upon the image, and, after ten minutes' washing, to develop with a wad of cotton-wool. Husnik remarks: 'The heating of the zinc plate is avoided, but the etching is coarser.'

Concerning the action of dyed resinous solutions further detailed account is given below.

Liesegang¶ recommends a somewhat tedious variation of the etching process, whilst it should be sought to hasten the process by etching for the shortest time possible.

Another formula** contains chrome alum, but is otherwise the same as the process upon copper.

The *Photogram* (1894, July and following numbers) treats of the zinc-enamel process, but does not contain much that is new. It attributes failure to impurities in the zinc, namely, presence of lead.

The *Photographische Correspondenz*, 1895 (pp. 57 and 106), contains a polemical treatise upon the zinc-enamel process, but no special technical directions are to be gathered from it.

Mac Farlane Anderson†† describes a new idea. Resin is saponified, an

* Valenta, *Photographische Correspondenz*, 1895, p. 339.
† V. Turati, *Photographische Correspondenz*, 1896, p. 101.
‡ Eder's *Jahrbuch für Photographie*, 1894, p. 490 (British Journal of Photography, December, 1893, No. 1754).
§ *Atelier des Photographen*, 1894, p. 702.
‖ *Photographische Notizen*, 1894, p. 164.
¶ *Photographisches Archiv*, 1894, p. 374.
** *Inland Printer*, 1894 (July number).
†† *Anthony's Photographic Bulletin*, 1895, p. 106

the aqueous solution neutralised. He adds some of this solution to the preparation of fish glue, and a small amount of heat is then sufficient to produce a resinous resist.

Hyslop describes a similar process dependent upon fine resinous emulsions.

However beautiful all these processes may appear at first sight, they are of little importance in practice, as the writer has proved by a large number of exhaustive experiments in these directions. It was found possible, even with plain chromated resinous soap, to obtain an image that adhered with gentle heat and afforded complete protection against acids.

Colin Campbell * recommends, instead of fish glue (which requires so high a temperature in enamelling that the zinc is modified), other substances that give a good enamel at a lower temperature; these are obtained from aquatic plants and seaweeds.

H. Müller † published practical experiences with these substances (carrageen moss), and they gave him good results.

G. Fritz ‡ published, in a paper read before the Vienna Photographic Association in 1895, his experiences of the zinc-enamel process. Preparation, printing, and development present nothing new in comparison with the enamel process on copper, excepting that twenty-five per cent. more water is used for the coating, because, according to the author, zinc is more porous in comparison with copper, and does not take the glue as well; but, in burning in, G. Fritz does not go above 150° C., at which temperature the dye disappears and the film turns yellowish. At this temperature enamel is not formed (fish-glue enamel requires a temperature of 280° C., and the colour then turns to chocolate-brown). For this reason a modification of the etching process is also requisite. Therefore, according to the image, the etching is from three to five minutes with 5 grammes of nitric acid and 400 grammes of alcohol, forty per cent. The plate is then inked up and immersed for about five minutes in a two to three per cent. aqueous etching bath, and finally for two to three minutes in the first alcohol and acid bath. The process takes from thirty to forty minutes, and is said to give faultless results. The alcohol in this process plays the part of a protecting agent to the glue film, which is easily attacked by water. §

Otto Müller ‖ published in July, 1895, his experiences of the zinc-enamel process. His method of preparation was the same as above, excepting that Müller used fresh instead of dry albumen. The development is carried out after coating with a stained solution of resin in chloroform and benzole.

The solutions of resin which we have already met with in a process by Husnik, as described above, serve the purpose of forming a resinous permeable covering to the glue print; that is to say, the watery developer has to make its way to the glue by passing through the resinous film, at the same time dissolving the particles of dye. The unexposed glue then begins to swell and breaks up the superimposed layer of resin, which has become friable, and it is then gradually set free by the watery developer. Gentle friction with a wad of cotton-wool facilitates the operation. The completely developed picture consists of insoluble glue with a coating of resin, and by gently heating to the melting point of resin) they are united to form a skeleton with protective capacity.

As far as the writer knows, the use of these stained solutions of resin was first published by E. Vallot. ¶ He used a solution of asphalt and methyl violet in ether.

* BRITISH JOURNAL PHOTOGRAPHIC ALMANAC, 1895, p. 716.
† *Photographische Correspondenz*, 1895, p. 388.
‡ *Photographische Correspondenz*, 1895, p. 224.
§ The same process is described in *Anthony's Photographic Bulletin*, 1895, p. 336.
‖ *Photographische Correspondenz*, 1895, p. 387.
¶ 'A New heliogravure process by means of albumen and bitumen.'—*American Annual of Photography*, 1893, p. 40.



London Stereoscopic & Photographic Company, Limited.

(Photomezzotype), 54, Cheapside, E.C.

BODIAM CASTLE, NEAR HASTINGS.

The process, however, is considerably older, and was formerly used by the writer in an unpublished process (albumen-bitumen), and likewise in connexion with the ordinary chromated albumen printing process on zinc. It is not easy to adjust the proportions of the solution, but the following formula gave excellent results :—

Methyl violet	3 grammes.
Syrian asphalt	10 ,,
Chloroform, dissolve in	200 c. c.

To this is gradually added benzole, 400 c. c., perfectly free from water (the water to be removed, if necessary, with calcium chloride).

Let the solution stand for forty-eight hours, filter, and replace the evaporated chloroform with about 25 c. c. more. By following the instructions exactly a solution is obtained that flows admirably, does not produce lines, and dries at once with a brilliant homogeneous surface.

If we summarise the variations in these processes, we have :—

1. *Alteration of the Zinc Surface by primary Etching.*—The plate is roughed, to make the film adhere more firmly.

2. *Hardening of the Enamel Film by incorporating Resinous Substances.*—These are either added to the solution or applied as a film after printing. In both cases the hardening is effected by gentle heat (melting point of resin).

3. *Hardening the Film of Glue by Tanning.*—The use of chrome alum, tannin, formalin, alcohol, &c., sometimes present in the coating solution, and sometimes in the acid. Variations of thia kind have been thoroughly tested in great number by the writer, and they are not sufficient of themselves, but render other modifications of the process indispensable.

4. *The use of Substances more easily changed to Enamel.*—Kinds of seaweed and aquatic plants, with which it is possible to enamel at a lower temperature.

5. *Modifications of the Etching Process.*—The use of etching fluids that do not too strongly attack the slightly enamelled glue ; * and methods of etching that will smoothly etch altered, crystalline zinc (in high-temperature enamelling). Concerning this last method, see following full instructions.

In the years 1895 and 1896 additional further studies were made in relation to the zinc-enamel process.

The writer has already pointed out that the chief advantage of the enamel process—richness of half-tone—depends upon the speading of the etching† (similar to Klic photogravure) and the use of copper, as an excellent metal for etching purposes. Further studies have shown, however, that the same advantages are equally attainable with zinc. These studies led to the following results, which are all based upon a modification of the etching process.

A print upon zinc is burnt in till it attains an intense brown colour, and is then treated with a weak solution of chromic acid, which has an oxidising and slightly solvent action upon the zinc.

The basic, aqueous zinc salt, formed secondarily in the small hollows, by its insolubility gives the process a specific character. If the plate is taken out of the chromic acid bath, it appears to be scarcely etched. If it is now immersed in a nitric acid etching bath, the depth of the etching becomes immediately visible, owing to the solubility of the zinc salt. In case of need, this process may be repeated several times, but with practice it can usually be done at one etching.

To form a clear conception of the nature of the process, imagine, in place of the zinc, a crystalline cake of salt soluble in water, upon the smoothly

* Husnik recommended the use of bromine for this purpose.

† V. Turati : 'Das Durchätzen bei dem Emailverfahren' (*Photographische Correspondenz*, 1896, p. 377.)

polished surface of which water is allowed to act. The water dissolves first the smallest of the crystals, and, penetrating the interstices between the larger crystals, the surfaces of which it merely dissolves and washes, forms an irregular, rough, crystalline cavity. If the water is retarded in its action by the addition of slimy substances (gum, dextrine, &c.), and is likewise turbid (forming a precipitate during the solvent process), the fine crevices will be filled up, and the solvent action will proceed gently within limits, and the points of the crystals will have time to dissolve before the crevices open too far. The formation of the hollow will be rounder and smoother, and very different from that obtained by using water only.

After a clear idea had been thus formed of the causes of the so-called 'rough etching,' it was possible to think out a modification of the ordinary process of etching with nitric acid, that is to say, a means had to be found of converting the process to a slimy, precipitating one. Slime may be easily produced by adding gum, &c., to the etching fluid; a precipitate may be obtained by various means, as well by chemical as by mechanical processes. The addition of various substances to the bath will produce a fine sediment during the etching, and the valleys of the crystalline mass may be filled up, whilst the summits of the zinc crystals are being dissolved. In this way the etching proceeds smoothly and regularly to its full depth.

This action may be easily demonstrated if smoothly polished zinc is heated to nearly melting point, allowed to cool, and then submitted to treatment with various acids.

By the use of a weak solution of chromic acid the zinc is etched, and at the same time the surface is covered with a precipitate of yellowish-brown, basic zinc chromate. If this is wiped away, the etched ground is quite smooth.

With ordinary nitric acid a rough, coarse ground is etched; and, on the other hand, a beautiful, even ground, if the above-mentioned slimy, precipitating nitric acid is used instead.

THE UTILISATION OF THE LIGHT WHICH PASSES THROUGH THE SENSITIVE FILM.

CAPTAIN COLSON, in a communication to the *Société Française de Photographie*, pointed out that a great deal of light passes through the film, and this can be utilised, and thus the exposure in the camera reduced, if a reflecting surface be placed behind the plate. The idea, as the Captain admits, is not new, but he has approached the subject from a somewhat new standpoint.

He points out that it is essential that the reflecting surface should be in immediate contact with the film, and that the image should fall on the plane of contact. This condition is essential for sharpness of definition and for the purity of the whites of the negatives, for a space between the two surfaces infallibly produces fog. It is also necessary to ensure that the plane of the focussing screen is coincident with that of the sensitive film.

A white surface, such as a sheet of white paper or card, is preferable to a polished metallic surface, in that the latter only reflects the light in particular directions, according to the well-known law that the angle of reflection is equal to the angle of incidence; whereas the card or paper diffuses the light in all directions, independent of the angle of incidence. The surface of the card ought to be glossy.

The first trial of this plan was made by placing a piece of white paper and a piece of black in contact with the gelatine, and with an exposure of 1-15th of a second. That part in contact with the white paper was much more intense than where in contact with the black.

The negatives made in this way are, of course, reversed as regards left and

right, but this is no disadvantage for projection, or for printing in carbon, or for photo-mechanical printing.

The only disadvantage in presenting the glass to the lens is that there is a slight distortion of the image towards the centre of the plate, due to the deviation of the rays, which strike the glass at an angle. Thus, assuming the refractive index of the glass to be 1·55, and the angle of incidence of the rays to be 30°, which corresponds to an angle of view of 60°, the distortion is equal to one-fourth of the thickness of the glass, so that with a glass two millimetres (=1·12 inch) thick, the distortion would be 0 5 mm. (=1·50 inch), which, for scientific work, is far too great, but which is quite negligeable for landscapes or portraiture. These figures only apply to the edges of the plate, and the longer the focus of the lens the less the distortion.

There must be, of course, also some little loss of light due to reflection from the front surface of the glass, and again from the second surface, and this loss increases from the centre to the edges of the plate, but the effects are inappreciable, even with a large field of view.

It might be supposed that the light reflected in the interior of the glass would cause fog, but that this is not so is proved by the fact that the whites remain clear.

To prove that the same intensifying action took place even when the light was very feeble, Colson copied a chromo-lithograph with a pinhole, and found that, with an aperture of 1-100 inch, and a camera extension of ten inches and an exposure of ten minutes, the use of a white card considerably intensified the negative.

In the case of celluloid films there is no loss by reflection, and it is unnecessary, in consequence of the thinness of the support, to expose them from the back.

In the case of a paper support, it will be seen, from the above reasoning, that paper coated with the same emulsion as a glass plate should be more rapid than the latter.

THE GUM-BICHROMATE PROCESS IN THREE COLOURS.

Ritter von Schöller has been using the gum process for producing three-colour prints, and gives some details of his method of working.

For the yellow plate he uses a cell filled with equal parts of solutions of methyl violet and rhodamine, the strength of which is not stated, but must be found by trial and error; as red, blue, and violet should not print, these colours must be opaque in these places, and he used Albert's emulsion 'eos,' and added ten per cent. of the R. P. dye sent out therewith, but Lumière's red sensitive may also be used.

For the red-printing plate a yellow and green sensitive plate should be used, and a filter of cupric chloride with some sulphate of copper.

For the blue plate a solution of aurantia, or a dark aurantia dry screen, may be used.

As pigments, Milori blue, gamboge, and Munich lake were used, and applied to the papers with bichromated gums, and further treated as has lately been described elsewhere. The process is practically the same as that about three years ago published in the *Photographische Correspondenz*.

Herr Watzek, who has also been working this process, uses an ordinary plate without a screen for the yellow plate. The red-printing plate is made behind a Lumière dark yellow screen, with a Lumière A or Edwards plate. The blue-printing plate is made behind a copper-red glass screen, and on a red and orange sensitive Lumière B plate. Watzek uses the same pigments as Schöller, but coats his paper with a two or five per cent. aqueous solution of shellac.

ACETYLENE.

We abstract the following from a Cantor Lecture delivered by Professor Vivian Lewes :—

Acetylene, or, as it is sometimes scientifically called, ethine, is a gaseous compound of twenty-four parts, by weight, of carbon, with two of hydrogen, and was first discovered and isolated by Edmund Davy in 1836, but it was not until 1859 that Berthelot's investigations gave the scientific world a clear conception of its interesting character and properties. Since that time it has been frequently prepared in small quantities by tedious and costly processes, and it is only within the last few years that a cheap and simple method has been discovered, and has brought its use within the range of commercial possibility.

The fact that carbon and lime could be made to directly act upon each other to form calcic carbide was discovered independently by Willson in America, and in France by M. Moissan, but there exists abundant proof that Willson was making and experimenting with calcic carbide, and had sent specimens of it to various correspondents some time before Moissan had made any announcement of his discovery, and therefore priority undoubtedly rests with the American discoverer.

Calcic carbide is a dark grey substance, having specific gravity of 2·262, and, when pure, a pound of it will yield on decomposition 5·8 cubic feet of acetylene. Unless, however, it is quite fresh, or means have been taken to carefully protect it from air, the outer surface becomes slightly acted upon by atmospheric moisture, so that in practice the yield would not much exceed 5 cubic feet. The density and hardness of the mass, however, protect it to a great extent from atmospheric action, so that in lumps it does not deteriorate as fast as would be expected; but, in the powdered condition, it is quickly decomposed.

On the addition of water to the calcic carbide, a double decomposition takes place, the oxygen of the water combining with the calcium, and once again forming lime, whilst the hydrogen unites with the carbon of the carbide to form acetylene.

At the present moment the future of acetylene as an illuminant is largely dependent upon two factors—the commercial production of calcic carbide of a reasonable degree of purity; and, secondly, methods for safely making and burning the gas in such a way as to develop its full illuminating power, whilst doing away with the risk of smoking; and, as I first drew attention to the production of the carbide, and from it of the acetylene on a commercial scale in this country, I feel that the results of the past two years' experience will not be without interest.

In spite of extended experience, both here and abroad, in the manufacture of calcic carbide, the details given as to its cost and the price at which it can be purchased offer the most entertaining reading, as, whilst the patentee and would-be seller of acetylene generating plant still talk airily of the cost of the carbide being anything from 30*s.* to 7*l.* a ton, the price at which one can purchase carbide more nearly approaches 30*l.* Indeed, in Paris, at the present moment, there is considerable difficulty in getting it at 40*l.* a ton, although we are informed that this is merely due to a temporary carbide famine, and that the new sources of supply will soon reduce the selling price even below 16*l.* a ton, at which it stood before the late rise in price. Be this as it may, the factor which interests us is the price at which carbide can be obtained in England, and the Acetylene Illuminating Company, who hold the Willson patents for the production of carbide, and also the Cowles electric furnace patents, which, I believe, enable them to control the manufacture of carbide in this country, have fixed their selling price at 25*l.* per ton; and, although

there is no doubt that they will give contracts in considerable quantities at a reduction on this price, yet it is with the factor of the selling price to the public, and not with the manufacturing price, that we have to deal.

In most cases, the possible prices quoted for calcic carbide by inventors, who have been carried away by their wishes rather than by hard facts, are simply absurd, and far below the price at which the substance can be produced, and it may be of interest if I give the figures for the electric power necessary, which I myself have obtained in practice in the manufacture of calcic cardide.

Having been kindly granted the use of the electric plant erected for the manufacture of calcic carbide at the experimental works of the Acetylene Illuminating Company, a plant capable of working continuously at from sixty to seventy volts at 1000 to 1200 ampères, I made a series of experiments in order to determine the best proportions in which to mix the ingredients from which the carbide is manufactured, and to find out the amount made per electric horse power.

The production of carbide from lime and carbon, under the influence of the heat of the electric furnace, appears to take place according to the formula—

$$CaO + C_3 = CaC_2 + CO,$$

and, in order to obtain this reaction, it would be necessary to use 56·1 per cent. of lime mixed with 43·9 per cent. of carbon. In practice, however, it must be remembered that the carbon used will either be finely powdered coke or charcoal, neither of which is pure carbon, whilst the lime employed will always vary in purity, such variations having, as I shall presently show, a very important bearing upon the purity of the carbide and acetylene produced from it. Another practical point also presents itself, and that is that, unless the mixture is suitably arranged, considerable variations in the amperage and consequent loss of efficiency in the furnace will result.

Using a mixture of 60 per cent. of lime and 40 of carbon, a run lasting 3½ hours yields about 112 lbs. of fused ingot, and of this 81 per cent. was practically pure carbide, the remainder being a crust of lower value.

The mixed carbides yielded 5 cubic feet of gas per pound, and contained 89·2 per cent. of true carbide, hence the yield may be taken as being 32 lbs. per hour of the commercial carbide.

The current used was 60 volts at 1000 ampères or 89 E.H.F., which gives, as the make, about 0·4 lbs. per E.H.P. per hour and the result of continued experiments shows that 0·3 to 0·4 lbs. per E.H.P. per hour is the average yield.

The cost of the electrical horse power will, of course, vary with the source from which it is obtained, and the use of steam power for generating the electricity appears too costly to be entertained, unless the present electrical lighting stations could see that it was to their advantage to level up their load by manufacturing the carbide under licence when not employed in supplying current directly for illuminating purposes. The Acetylene Company have, however, secured considerable water power at the Falls of Foyers, and a full installation of carbide plant is at work there, whilst still further water power has been secured in a convenient position, and additional works will be erected; but it will always be the demand, and not the cost, of the carbide which will govern the price.

The following yields of acetylene, from various samples of commercial carbide that I have analysed, give an idea of the variations to be found in the article:—

Swiss carbide per lb.—I. yielded 4·38 cubic feet of acetylene; II. yielded 4·60 feet; and III. yielded 4·56 feet.

German carbide per lb.—I. yielded 3·82 cubic feet of acetylene; II. yielded 3·46 feet; III. yielded 3·24 feet; IV. yielded 2·43 feet.

English carbide per lb.—I. yielded 5·24 cubic feet of acetylene; II. yielded 4·84 feet; III. yielded 5·04 feet; IV. yielded 5·52 feet; V. yielded 4·84 feet; VI. yielded 5·32 feet.

It is evident, therefore, that there are wide differences in the commercial article, but, with reasonable care in the manufacture, the carbide should yield an average of 5 cubic feet of acetylene per pound.

The gas obtained from the English carbide is very pure, the chief impurity being 2–3 per cent. of sulphuretted hydrogen, due to sulphur in the coke and gypsum in the lime, whilst with many of the Continental samples 6–9 per cent. of impurities is by no means uncommon, one of the principal and most dangerous impurities being phosphuretted hydrogen, which is evidently due to the use of phosphatic lime in the manufacture of the carbide, and also traces of siliciuretted hydrogen. So bad is this with some samples that the acetylene produced from one batch obtained from Denmark actually gave a haze when burnt for some time in a small room.

It is manifest that, if the carbide is contaminated with calcic phosphide, the action of the water on it must give rise to a certain quantity of spontaneously inflammable liquid phosphuretted hydrogen as well as the gaseous compound, and the liquid condensing during compression or in the storage holder is a very grave source of danger. No lime or coke should be used in the manufacture of carbide which contains more than the smallest trace of phosphate, and, if this point is not more carefully attended to than it is at present in some of the Continental works, serious accidents are sure to follow; whilst, if this be done, as is the case in the manufacture of English carbide, no danger from this cause need be apprehended.

Ammonia is also found as a frequent impurity in acetylene, and gives it the power of attacking copper with the formation of an explosive compound.

In the paper which I read before the Society of Arts in January, 1895, on acetylene, I pointed out the ease with which the acetylene was liberated from the carbide by the action of water, and suggested several forms of apparatus in which such decompositions might be brought about. These suggestions were followed by a rush of would-be inventors upon the Patent Office, the literature of which has been increased to an alarming extent during the past two years by patents, many of which are characterised neither by novelty nor utility, and which, moreover, are in cases fraught with considerable danger. With the further experience which I have gained in the production and properties of this gas, I now see that many of the hints which I threw out in that paper as to the construction of apparatus would be fraught with many drawbacks, as, although most of the dangers with which acetylene was then credited have disappeared into thin air, some other totally unexpected ones have taken their place, and, most manufacturers of acetylene apparatus being still ignorant of these, a lively time may be expected for those who employ apparatus constructed by people who, possessing a limited mechanical knowledge, know absolutely nothing of the properties of the gas with which they are dealing, and these are certain to to give rise to many troubles in use, and so retard the utilisation of this beautiful illuminant.

In the generation of acetylene from calcic carbide far too little attention is being paid to the high temperature evolved when any considerable quantity of it is brought into contact with water, and the effect which this has upon the gas. Several attempts are being made to introduce automatic machines for the generation of acetylene on the principle of the ordinary 'Kipp's' sulphuretted hydrogen apparatus; indeed, several of them are only modified copies of this in metal, and the idea of the manufacturers is evidently that the action will cease, and the evolution of acetylene be stopped, when the pressure of the gas drives the water back from the carbide; but this is not so, as the heat of the action saturates the gas present with water vapour, and, as the apparatus cools, this recondenses on the carbide and produces more gas, whilst the un-

changed carbide will decompose the vapour before condensation, and even dehydrate the calcic hydrate which was formed on its surface when the water was in contact with it. The result of this is that, after the gas has once been made, no automatic arrangement will stop the slow generation of the gas from the carbide in the apparatus.

When the gas is being continually used, this does not matter much, as the slowing down of the evolution of the gas is sufficient to allow the consumption to catch up the make; but, when the gas is turned off, if any quantity of carbide be undecomposed, the automatic generator, with its small holder, becomes an active danger, as it will either 'blow' or generate dangerously high pressures.

In any form of generator where the quantity of carbide is large, the heat generated by the action of the water on the material is quite sufficient to polymerise some of the acetylene into tar-like products, which will sometimes cause trouble and stoppages in the pipes, whilst in any case the high temperatures cause a large amount of steam to go forward with the gas, and, unless special precautions are adopted to prevent it, such as using a sufficiently large holder, some of this is carried forward to the service pipes.

There is no doubt that, for the use of the gas in country houses, a holder large enough for the evening's supply should be provided, and the generators not charged with more carbide than is necessary to yield a volume of gas equal to the capacity of the holder.

The dangers of acetylene, of which a good deal has been heard lately, are almost entirely dependent upon the use of impure carbide and improper apparatus. Pure acetylene has now been shown to be less poisonous than ordinary coal gas, and far less so than coal gas enriched with carburetted water gas, whilst the action of pure dry gas on metals is practilly *nil*.

It is well known that acetylene can be resolved into its constituents by detonation, and the idea has arisen from this fact that acetylene is itself an explosive of great power. This is, however, an error, as it has been clearly shown that, when the gas is under ordinary atmospheric pressure, if detonation is started in acetylene by a charge of mercuric fulminate, the explosion only extends a few inches from the detonator, whilst the explosion in acetylene of acetylide of copper is sufficient to set up detonation of the gas under these conditions.

This, however, only applies to acetylene under ordinary pressure, and any attempts to liquefy acetylene by the pressure created by the evolution of the gas from calcic carbide is an extremely dangerous operation, as, if the heat of generation be added to the heat evolved during compression, an action akin to detonation is very likely to take place, with the resolution of the acetylene into carbon and hydrogen.

Out of the many forms of generator which have been patented in this country and abroad, there are some which, although there is no very startling novelty in construction, yet afford safety in use, and intending users of acetylene apparatus should make sure that the generators they employ have been examined and certified as safe by some competent authority.

I have pointed out some of the troubles existing in the generation of acetylene on a commercial scale, but, given a good form of generator, the trouble which still exists is that there are but few burners at present manufactured which can be relied upon to consume it in such a way as to develop from it its wonderful illuminating power for any great length of time without smoking, and, when the burner itself starts smoking, it can easily be realised that its capabilities in that way are immense.

For domestic illumination a burner consuming more than 1 cubic foot of the gas per hour would have too intense a light to be practically usable, and I have found it possible to make a burner which, for this consumption, shall emit a light of from thirty-two or thirty-four candles, which is ahead of the

duty obtained for the same consumption by any other burners which I have tested; but with all burners, good and bad alike, after a certain period of perfect burning, which may extend to several hundred hours, a time is sure to arrive when the burner commences to smoke, and, as a rule, all that can be done with it is to take it out and put in a fresh one. The cause of this is that in all burners fitted for the consumption of acetylene the holes or slits through which the gas issues have to be excessively fine, and in time the heat of the burner causes the polymerisation of some of the acetylene into liquid hydrocarbons, which, being decomposed in the hole or slit, give rise to a slight carbonaceous deposit and the growth of carbon filaments from the outlet. The carbon filaments can easily be removed when they make their appearance, but the partial stoppage in the fine aperture of the burner itself upsets the balance of the burner and causes smoking.

The fact that burners can be obtained cheaply which for a limited time give satisfactory results enables dealers to sell burners and to declare that no such trouble exists, but the public who are induced to buy will soon discover the facts for themselves.

Acetylene is soluble in water and many other liquids. At ordinary temperature and pressure ten volumes of water will absorb eleven volumes of the gas, but, unless the gas be bubbled through the water, the absorption is hardly noticeable in the case of an ordinary receiver or gas-holder, as the surface of the water rapidly becomes saturated, and after that the absorption is very slow, whilst, when the whole bulk of water is completely saturated, the absorption stops.

The solubility of the gas may also be largely done away with by dissolving salt in the water surrounding the gas-holder; but this has a destructive action upon the metal of the holder, and it is therefore better to use ordinary water as the liquid over which the gas is collected and stored.

The gas can be condensed to a liquid under a pressure of 21·53 atmospheres, or 323 lbs. at a temperature of 0° C., whilst at ordinary temperatures the pressure necessary to keep it in the liquid state is from 500 to 600 lbs. on the square inch, so that the liquefied gas can readily be stored and transported in steel cylinders of the kind employed for liquid carbon dioxide.

The liquid so produced is mobile and highly refractory, and when sprayed into air the conversion of the liquid into the gaseous condition absorbs so much heat that some of the escaping liquid is converted into a snowlike solid, which takes fire on applying a light to it, and burns until the solid is all converted into gas and consumed.

The possibility of liquefying acetylene at pressures about those at which liquid carbon dioxide is produced so largely enables considerable volumes of gas to be compressed into the liquid state in small wrought-iron or steel cylinders, and in this condition, by means of suitable reducing valves and burners of the right construction, it may be stored and burnt. The small cylinders can also be arranged in the form of portable lamps, whilst for use in the country, where no gas is available, a large cylinder of the liquid gas placed in an outhouse would supply a country house with light for a very long period.

It is now well recognised that all luminous hydrocarbon flames owe their light-giving properties to fine particles of carbon liberated within the flame by various processes of decomposition, and raised to incandescence partly by the heat of the flame, and partly by the heat generated by the same actions which caused the separation of the carbon, and it is to the formation of small traces of acetylene in all hydrocarbon flames that a large amount of their luminosity is due. We should therefore expect that acetylene when burnt by itself would be the most brilliant of all gaseous illuminants, an expectation which is fully borne out by the results in practice.

Acetylene gas, when burnt, gives a flame of intense brilliancy, and, owing

to its richness, it can only be consumed in small burners. Under these conditions it emits a light greater than that given by any other known gas, its illuminating value, when properly developed, calculated to a consumption of 5 cubic feet an hour—the average consumption of ordinary coal gas—being no less than 240 candles. It is thus seen that, when acetylene is burnt in suitable burners, it develops an illuminating value fifteen to twenty times greater than that obtained by the combustion of the same volume of coal gas, so that, for all practical illuminating purposes, a very small consumption of acetylene in the burners which practice has shown to be best suited for the purposes, does the illuminating work of a very large volume of coal gas, with the result that the air of the room is but little contaminated with the products of combustion, and the excessive heating of the upper portions of the air is reduced to a minimum.

The following table contrasts the products of combustion evolved from London coal gas when consumed in various forms of burners, and giving an illumination of forty-eight candles, which may be presumed to be the amount of light required in a fair-sized London dining-room, and contrasted with this is the amount of the products of combustion which acetylene would evolve in giving the same amount of light, whilst, to make the meaning clearer, I have added the number of adults who would exhale the same amount of carbon dioxide in the same time :—

Burner.	Gas consumed.	Carbon dioxide.	Adults.
Flat flame, No. 6	19·2	10·1	16 8
,, ,, ,, 5	22·9	12·1	20·0
,, ,, ,, 4	25·3	13·4	22·3
London Argand	15·0	7·9	13·1
Acetylene	1·25	2·50	4·5

If we obtained the same amount of light from paraffin lamps, the carbon dioxide evolved would be equivalent to 22·5 adults; whilst, as far as carbon dioxide goes, you might as well invite 32·7 more guests to dinner as use forty-eight sperm candles to supply the needed illumination.

It has been said that the danger of an explosion from a leakage of acetylene is far greater than with coal gas. This is, I think, a mistake. Mixtures of air and acetylene are explosive over a slightly wider range than is the case with mixtures of coal gas and air; but it must be remembered that, if a leakage were caused by a tap being left on, the largest acetylene burner would probably only pass one cubic foot of gas per hour, whilst an ordinary No. 4 or 5 union jet burner would pass 5 to 6 cubic feet of coal gas in the same period of time, and from this cause, therefore, would be far more dangerous than acetylene; whilst, if the leak were from a small crack or a leaky joint in a pipe, the rate at which the gases diffuse out would be dependent upon their specific gravity. Coal gas has a specific gravity of 0·4 as against 0·9 for acetylene; so that through a crack or fissure of the same size only two volumes of acetylene would escape, whilst three volumes of coal gas would find their way into the air, a difference in rate which would more than cover the slight difference in the limiting proportions of explosion, and very little experiment will clearly prove that acetylene cannot in any way be looked upon as more dangerous to property than coal gas.

The field for acetylene at the present time is simply enormous, as not only is it specially adapted for the lighting of country houses and small villages and towns where no coal gas supply at present exists, but it will probably, in

the near future, take the place of existing forms of lighting in railway carriages, tramcars, floating buoys, &c., whilst, as an auxiliary to the electric light for light-houses, search lights, and coast defence, it will, I believe, be of the greatest possible value.

Should any cheapening of the production of the calcic carbide take place, there is even a larger sphere of usefulness awaiting it—a sphere, moreover, in which the troubles found in the consumption of acetylene, *per se*, will entirely disappear. There are many places in this country where the cost of good gas coal makes coal gas prohibitive in price, whilst on the Continent these troubles exist to a far greater extent, and, if it were commercially possible to use acetylene as an enricher of a cheap fuel gas, an enormous field would be opened up.

When acetylene was first rendered a commercial possibility, numbers of experiments were made in order to see if this could not be done, but the results were most discouraging, as, instead of each 1 per cent. of acetylene added to the diluting gas, giving a value of about 2 candles, it was found that it was necessary to add something like 10 to 15 per cent. before the mixture became endowed with any luminosity at all, and that, with water gas, an admixture with 20 per cent. of acetylene was necessary to give anything approaching a 20-candle gas. With a poor coal gas, however, the enrichment value of the acetylene gives better results, but still not sufficiently good to hold out any great hopes of acetylene replacing oil as a means of enrichment.

This curious phenomenon, of high illuminating value when consumed by itself being reduced so enormously when the gas was used as an enricher, led me to make a long and exhaustive series of experiments on the causes which led to it, and I have now found the reason for this apparent anomaly, and also a way in which it can be obviated. The result is that it would be perfectly easy, by a simple and rapid process, to make a fuel gas costing from 8*d.* to 1*s.* per 1000, and by the addition of 10 per cent of acetylene to raise this to an illuminating value of about 20 candles, a result which, given cheap carbide, would open up an enormous use for acetylene gas.

For use in country houses, or generally for domestic illumination, it has been proposed to dilute the acetylene by means of air, apparatus for making the mixture of acetylene and air having been tried both in this country and in America; but so wide is the explosive range of mixture of this character that any such apparatus would be of the most highly dangerous nature, and, should any one, from want of knowledge, be willing to adopt it, I should expect that the insurance companies would firmly prevent their introduction by declining to insure buildings in which such methods of illumination were adopted. It is perfectly easy to make a mixture of acetylene and air which will burn with fine effect and a non-smoking flame, but the apparatus employed to give such a mixture is always liable to get out of order, and an alteration in the proportions in which the gases were mixed might lead to the most disastrous results. A safe method of attempting this is to make an acetylene burner in which, in the burner itself, the gas escaping through an injector shall draw in the necessary amount of air for its consumption; but all the burners that I have seen on this principle have the drawback of requiring a high pressure of gas, in order to work satisfactorily, whilst even then the results obtained from them are of a very variable character, and smoking by no means an unknown thing.

Any other diluent than air would require special apparatus for its production, and this would do away with the charm of simplicity in manufacture, which renders acetylene so well adapted for illuminating country houses. It is well known that the carbides of some metals give, on decomposition by water at a slightly elevated temperature, other hydrocarbons, and in some cases mixtures of hydrocarbons and hydrogen, and, if such carbides be mixed with the calcic carbide, the heat of the decomposition of the calcic carbide

by water, and the slacking of the lime produced, causes the decomposition of the other carbides present, and you get a mixture of gases evolved, which can be made to approximate to the composition of coal or oil gas. Taking, for instance, the carbide of calcium and aluminium, you obtain a mixture of marsh gas and acetylene, which, whilst giving a magnificent illuminating power, can be consumed without fear of smoking, whilst, if the carbide of manganese be used instead of the carbide of aluminium for mixing with the calcic carbide, a mixture of marsh gas, hydrogen, and acetylene can be got, and possibly, when the best method of forming carbide has been obtained, it will be found preferable to use mixed carbides of this character rather than calcic carbide by itself.

DEVELOPMENT OF PRINTING-OUT PAPER.

SLIGHTLY exposed prints on gelatino-chloride of silver, collodio-chloride, or albumenised paper, may be developed to full strength with gallic acid. This kind of development is called 'physical,' in contradistinction to the 'chemical' development of bromide paper and dry plates.

In 1892 Valenta drew attention to the fact that some other developers besides gallic acid could be used for the purpose. As the method seems to be coming more into use (says R. E. Liesegang), I have made an examination of the behaviour of these substances.

The varying substances, such as hydroquinone, pyrogallol, and para-amido-phenol, act with much greater dissimilarity in physical than in chemical development. According to the method of treatment of the prints with one or other of these developers, or according to other ingredients added, different tones, different shadows, and different gradations are attainable.

We will first make a few prefatory generalisations concerning the properties of the various substances.

Nearly all of them will develop printing-out paper if dissolved in water only; but, whilst gallic acid and hydroquinone may be used in concentrated solution, pyrogallol, eikonogen, and glycin, in strong solutions, act far too rapidly for general use. They must either be diluted very considerably, or their action must be restrained by addition of acid. Mixtures of pyrogallol and citric acid have been repeatedly recommended. Although development proceeds normally, I strongly deprecate the use of very acid solutions, as they are very liable to produce sulphur toning. For this reason I prefer 'weak developers,' preferably hydroquinone or gallic acid, to the others. These two may even be used with a weak alkali. Thus gallic acid is nearly always used with acetate of soda, especially the fused. But this cannot be termed an alkaline developer. It must be remembered that printing-out papers usually contain a considerable amount of organic acid, which enters the bath. A really alkaline developer would immediately blacken the paper uniformly.

The less acid the developer, the greater is the depth acquired by the shadows.

The more acid the developer, the redder the tone becomes in fixing.

The redder a print is developed, the greater is the loss of intensity in fixing.

According to the developer selected, the same print will yield the most varied tones by simple fixation without toning with gold. They may range from green-black to olive, brown, dark red, and even to the pale yellow of a printed picture treated with hyposulphite of soda only.

The latter, especially, cannot be used without further treatment, and must be toned with gold, preferably in a combined toning and fixing bath. In this the picture tones as readily as an ordinary print. The other colours may be used without further treatment with a gold bath. The green pictures may be

toned with gold, but will not give the usual violet 'photographic tone.' If we form a clear conception of the toning process, the difference in behaviour is readily understood. In the treatment with chloride of gold, a film of metallic gold is deposited upon each particle. From its thinness the film is blue. The red of the silver is transmitted more or less through the blue gold, and thus the red-brown to violet tones are produced, to which we are accustomed in the ordinary process. If we attempt to deposit gold on a bromide print, it will not 'tone,' and the same is almost as impossible with the green developed image on gelatino-chloride paper.

It is therefore necessary to discriminate between two principal processes:—

First.—Development followed by simple fixation.

Second.—Development followed by toning. Pictures treated in this way behave similarly to those that are printed out.

The following experiments were made with a species of gelatino-chloride paper (Liesegang's Aristo). For our purpose, the results are applicable to other kinds of emulsion paper, if allowance be made for differences in excess of silver nitrate and acid. The more free silver present, the greater is the depth of picture. The larger the amount of acid in the paper, the less is required in the developer. Strips of paper were exposed for equal length of time under a photometer made of tissue paper, and then immersed in the different developers, with following results:—

Gallic Acid.—A saturated solution was made with cold water. The prints were developed with it in less than two minutes. After fixing, they were green in tone, with almost black shadows. Gallic acid inclines especially to the production of green tones, and the chief point is that the print shall remain long enough in the developer. The picture must consequently be only slightly printed, and, to avoid flatness, the negative must be somewhat vigorous. From flat negatives green prints cannot be obtained, because they cannot be kept long enough in the developer. If a strip of paper is allowed to remain for a minute only in the developer, a fine brown tone is obtained after fixing; even the weak half-tones are not yellow. This is a perfect substitute for gold toning, and I have no doubt will supersede it in time. To obtain this tone with hard negatives, it is only necessary to expose rather longer, for instance, to half print them.

Gallic acid is usually employed with fused or crystallised acetate of soda. This addition tends to accelerate development. The tone is approximately the same as with plain gallic acid. The solution deteriorates more quickly, and a black precipitate of metallic silver is formed; but, by the addition of gum arabic, or fish glue, this decomposition may be considerably retarded. The addition of strong alkalies is quite unsuitable. The bath must be considerably diluted to permit of the addition of a small quantity of carbonate of soda. Phosphate of soda acts like the stronger alkalies.

Salts of lead have very often been used in conjunction with gallic acid. Dr. Van Monckhoven recommended a solution of gallic acid and acetate of lead for his nitro-glucose paper (see Dr. P. E. Liesegang's *Silberdruck*). Lebiedzinsky, in 1890, also gave the following formula for celloidine paper:—

Water	1	litre.
Gallic acid	4	grammes.
Acetate of soda	20	,,
Nitrate of lead	2	,,
Citric acid	6	,,

I have tried the addition of acetate of lead to pure gallic acid, and a heavy white precipitate of gallate of lead was thrown down. A portion of the gallic acid was, of course, rendered inactive, and the solution worked much

slower. I did not find any improvement in the tone. It was formerly thought that the salts of lead conduced to sulphur toning with the combined bath. I have not been able to prove that the small traces brought by the prints into the fixing bath have this effect. There are no considerations that recommend the use of lead salts with the gallic-acid developer.

Gallic acid also develops in presence of citric and tartaric acids. The bath remains clear for a longer time, and works much slower. The tone of the picture is somewhat red, and loses much strength in the fixing bath. Sulphur toning usually occurs if the prints are not thoroughly washed between development and fixation. Sulphite of soda has a decided restraining action, but the pictures do not tend to hardness as with acids, and are softer with larger additions of sulphite to the solution. The tone is red-brown. I have not been able to obtain green tones. An addition of acetate of soda to the bath increases the softness of the picture.

I recommend a bath of—

Concentrated gallic acid solution	20 c. c.
Acetate of soda	1 gramme.
Fish glue	3 c. c.
Water	20 ,,

Hydroquinone, of all developers, offers the strongest contrast to gallic acid. Whilst the latter has a distinctly independent toning action, without recourse to a subsequent toning bath, this is scarcely possible with hydroquinone. Consequently the pictures cannot be simply fixed, and must be treated with a combined bath. It may be used, dissolved in water only, or with addition of citric or acetic acid. Paper developed with plain or acid hydroquinone does not differ from an ordinary print when immersed in the fixing bath. It loses much of its intensity, and turns reddish-yellow. Acetate of soda, again, accelerates the action, and the colour is somewhat browner. This may be increased by a small addition of phosphate of soda, but a slight excess at once blackens the entire film.

Pyrogallol.—For development with water, this can only be used in very weak solution. The colour is a fine brown to warm black in the deep shadows, and, as with gallic acid, the colours produced do not require any further toning. For these brown tones I consider pyrogallol more suitable than gallic acid. Green is also producible, but gallic acid is far superior for the purpose. A more concentrated solution is necessary, and the developer is then too energetic.

Citric or tartaric acid retards development but I prefer to use a very dilute solution of plain pyrogallol, as the acid increases the risk of sulphur toning, and the completion of development cannot be easily estimated owing to the great loss in the fixing bath. Dr. van Monckhoven recommended for his nitro-glucose paper a solution consisting of—

Water	2 litres.
Pyrogallol	1 gramme.
Citric acid	10 grammes.

Cronenberg has used a similar bath for Aristo paper.

Very weak alkalies bring about an immediate discolouration of the entire film, and the same is the case with addition of sulphite of soda. It must be remembered that such a solution of pyrogallol will develop a dry plate (chemically). Moreover, the commercial sulphite is nearly always rather alkaline. A normally active developer is obtained by mixing pyrogallol with both sulphite of soda and a considerable quantity of citric acid, but the tone

is much inferior to that produced by plain pyrogallol. Valenta has chiefly used such a solution, but it should be observed that he supplements it with a combined toning and fixing bath. His formula is as follows :—

Water	1 litre.
Sulphite of soda	100 grammes.
Pyrogallol	10 ,,
Citric acid	11 ,,

Valenta remarks : 'Tho developer is clean and rapid for the various kinds of paper. It is but slightly discoloured after much use, and will keep for some time, even after use. The citric acid acts as a restrainer, and keeps the picture clear. In most cases development is complete in a few minutes, and, after washing in water, the pictures acquire a warm, pleasant tone, ranging from brownish-red to purple-black, by use of the combined toning and fixing bath.'

Para-amidophenol (the pure salt, not acidified with hydrochloric acid).—This acts almost in the same way as pyrogallol. In a weak aqueous solution is quite as suitable for the production of brown tones. If mixed with sulphite of soda (and likewise with citric acid in addition), as Valent and Haneke have done), red tones are produced that necessitate the use of a combined toning and fixing bath. Heneke's formula is the following :—

Water	1 litre.
Sulphite of soda	50 grammes.
Para-amidophenol (acidified with hydrochloric acid)	7 ,,
Citric acid	8 ,,

Ortho-amidophenol.—This behaves in the same manner as para-amidophenol with reference to tone. Apart from the nascent silver, the solution soon assumes a yellow colour, and easily stains the back of the paper yellow, especially in the presence of acetate of soda.

Metol.—This is a very pleasing developer. Greenish and brown tones are both obtainable with it. Very weak aqueous solutions must be used. The precipitate formed is lilac in colour, and does not agglomerate, like that produced with a gallic acid or pyrogallol developer. The addition of sulphite of soda produces an immediate discolouration of the entire film. If much tartaric acid is added, the picture slowly develops yellowish red. It is, moreover, remarkable that long immersion in the fixing bath produces strong sulphur toning (with precipitation of sulphur), notwithstanding the presence of the sulphite.

Pyrocatechin.—This acts like hydroquinone with regard to tone, and the combined toning and fixing bath must always follow. Compared with hydroquinone, it has the disadvantage of producing a yellow (leather-coloured) precipitate, which easily stains the front and back of the picture rather yellow.

Amidol, eikonogen, glycin, phenyl-hydrazine, and amidocoll (*i.e.*, p-amidophenylglycin of Lucius C. Brüning) are much too energetic in plain aqueous solution. A quantity of tartaric acid must be added to restrain their action. Considerations of sulphur toning render these developers unavailable. I may add, that not only for permanency should sulphur toning be avoided, but a very important factor for consideration also is the change in colour of the print.

Tannin.—This also is useless. It develops after the manner of hydroquinone, but easily stains the back of the paper yellow. Moreover, it spoils the combined toning and fixing bath. If, for example, weak alkaline tannin

is added to a solution of hyposulphite of soda, a flocculent substance is precipitated.

Sulphate of Iron.—Used almost exclusively for a long time in the development of wet-collodion negatives. This is useless for our purpose, as it stains the front and back of the paper orange, and the discolouration cannot be avoided by addition of restrainers, such as citric acid, sulphite of soda, fish glue, or other admixture.

Consequently, for practical purposes, only gallic acid, hydroquinone, pyrogallol, para-amidophenol, and metol are of importance.

A PROTEID PRINTING PROCESS.

This process is the invention of Dr. Max Jolles and Dr. Leon Lilienfeld, of Vienna, who remark that, in contradistinction to the albumens, gelatines, &c., heretofore employed, it has been discovered that proteids in which phosphorus is present can be successfully used. Proteids containing phosphorus, known by the various names of nucleo-proteids, nucleo-albumens, nucleo-globulins, nucleins, paranucleo-albumens, paranucleo-proteids, para nucleo-globulins, para-nucleins, &c., are such proteids containing phosphorus in organic combination. The nucleo-proteids, &c., contain the phosphorus in the form of nucleic acid, an organic acid containing phosphorus which is combined with egg albumen, and gives as products, on splitting up, the so-called alloxur or xanthine bases, guanine, xanthine, adenine, hypo-xanthine, &c., whilst the paranucleo-proteids, &c., do not give the said alloxur or xanthine bases on splitting up.

To the nucleo-proteids belong, for example, the nucleo-albumens, nucleo-histons, nucleins, &c., obtained from animal and vegetable material. To the paranucleo proteids belong, for example, vitelline, ichtuline, casein, legumin, &c.

A suitable proteid or a mixture of several is dissolved in an alkali, alkaline earth, or a salt thereof capable of dissolving the proteid or the mixture of proteids selected, either in the warm or cold state, and the concentration of the proteid solution is brought to the required degree to suit the brilliancy and thickness desired for the time being. For ordinary purposes a 10–12 per cent. solution of the proteids in a 3–6 per cent. solution of the salts will be found suitable. The addition of a small quantity of alcohol is advantageous under some circumstances. The proteid employed can also be tanned with a solution of formic aldehyde, tannic acid, alum, &c. The solution so prepared is salted in the ordinary way with a haloid, and either mechanically or manually coloured or left uncoloured, filtered through paper, flannel, leather, hemp, or the like, or by known methods in either a hot, warm, or cold state as desired, or applied to a suitable paper in its original condition. For this purpose either fine paper, free from woody fibres, or paper provided with a layer of chalk, baryta, or, in general, any other paper suitable for photographic purposes, can be employed. The proteids containing phosphorus can also be used either alone or mixed together, or even in combination with other substances in order to apply them, with a salt of an alkaline earth (barium, calcium, &c.), to the desired papers, to serve as a foundation layer, on which a suitable coating is applied, this coating being already sensitised or adapted to be subsequently sensitised.

The paper can be used satined or unsatined. The paper finally can receive single or multiple coats of the proteid solution selected.

The proteids give, with halogen-silver salts, with correctly chosen concentrations of the proteid and silver solution and correct proportions of added salts, emulsions which, when applied to paper, give a highly sensitive, durable, and brilliant copying or printing paper.

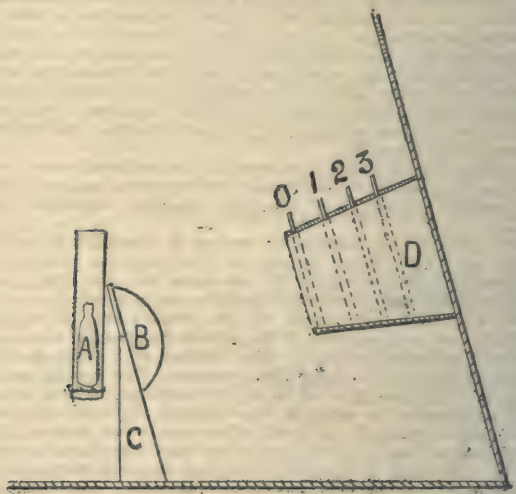
The improved proteids can, if desired, be used with albumen, gelatine, celloidin, collodion, or other known materials suitable for the purpose.

SOME PATENTED INVENTIONS OF THE YEAR.

(Selected and condensed by the Editor.)

RETOUCHING DESKS: MCNAB'S IMPROVEMENTS.

THE invention contemplates the use of a steady and powerful light, such as incandescent gas, electric light, and the like; a plano-convex lens or a spherical globe containing tinted water or other fluid, with a combination of ground and tinted glasses, inserted in a conical grooved box.



In this manner Mr. McNab produces a steady and efficient light for retouching, which can be increased or decreased at will, without losing the efficiency of the light.

In the drawing, A indicates the illuminant; B indicates the plano-convex lens with stand, C; D indicates the conical grooved box; 0, 1, 2, 3, indicate grooves and glasses inside box, open at top.

REPRODUCING DRAWINGS: GAY'S METHOD.

THIS process consists in treating glazed drawing-paper with a mixture composed as follows:—

Gum arabic	100 grammes.
Bichromate of potash	40 ,,
Water	300 centilitres.

A certain quantity of commercial carbonate of soda—half a gramme, for example—is preferably added to the water.

This mixture is spread, by means of a plush brush, upon the paper, which is then dried in the usual way.

The paper thus rendered sensitive is ready for the reproduction of a drawing on tracing paper.

As this paper is much more sensitive than ferro-prussiate paper, there is no need for a longer exposure to the light than five to fifteen minutes, according to the clearness of the day and the quality of the tracing paper, the opacity of which varies greatly.

The paper, after exposure, shows a dark yellow drawing upon a brownish ground. The paper is then submitted to a first washing, which must be very delicately carried out; then to a second, with the aid of a sponge, until the lines of the drawing appear hollow, owing to the dissolving action of the water.

The paper is then taken out of the bath, dried first with blotting-paper, and then exposed to the air.

The paper is afterwards coated by means of a sponge with the following composition:—

Gum lac	75 grammes.
Lamp-black	70 ,,
Spirits of wine of commerce	750 centilitres.

It is then plunged into a bath of hydrochloric acid, in which it is allowed to remain for about twenty minutes.

The paper whitens under the action of this acid, and the drawing comes out in black.

It is then cleaned by brushing and washing in pure water, then dried, and the operation is complete.

NON-INFLAMMABLE CELLULOID.

Celluloid is, as is well known, largely used, but it has the great drawback of being highly inflammable, which renders its manipulation and use dangerous.

For the production of non-inflammable celluloid, Madame Asselot takes the ordinary celluloid and dissolves it in acetone in about the proportion of 25 grammes of celluloid to 250 grammes of acetone. She also dissolves pulverised magnesium chloride in alcohol in about the following proportion:—

150 grammes of alcohol to 50 grammes of magnesium chloride.

Then the patentee mixes the two solutions together so as to finally obtain a paste containing, say, 20 grammes of the magnesium chloride solution for each 100 grammes of solution of celluloid.

The paste obtained in this manner is thoroughly mixed, and after it has been dried constitutes the non-inflammable celluloid.

This new product possesses all the transparency, elasticity, and other qualities of ordinary celluloid, and, in addition, is absolutely non-inflammable.

The new celluloid obtained by this process can be used for all purposes for which the ordinary celluloid is used.

COLOUR PHOTOGRAPHY: BAUMGARTNER'S IMPROVEMENTS.

Mr. Albert Baumgartner states that it has been already proposed to carry out the process of three-colour photographic reproduction by combining the three colours on one plate, putting them in the form of fine or delicate points or lines, forming in effect three-coloured mosaic. On the plate thus prepared bromide of silver emulsion is put, exposed to light from behind the plate, developed, and thus is obtained a coloured representation by one operation.

This process, however, has not been employed until now, because the manufacturing of fine-grained three-coloured plates offers great difficulty in the usual method of chromo-lithography.

The present process permits, however, of manufacturing such plates without particular technical difficulty, and allows, at the same time, of the employment of any number of colours.

The essential feature of this method is that colours are put on alternately by printing, and in a chemical way, in such a way that, by means of print and oil colour, an incoherent coloured coating graining is first given to the plate, and then the spots or places left uncoloured are afterwards coloured, by means of dyeing, corroding, or etching (like the manipulation in cotton printing), in which operation the colour does not adhere at the places previously printed with oil colour.

If, for instance, a sheet of celluloid is coated with gelatine, or a similar substance, and a red graining is printed on it from a granulated lithographic stone or zinc plate in oil colour, when this plate is dipped into the solution of an aniline colour—for instance, blue-green— only those spots will take up the colour which have not been printed with the red oil colour.

When, again, a graining of yellow oil colour is printed on, which will partly fall over the red and partly over the blue, the result is orange and green; finally, the spots which are not covered by the yellow colour can be dyed still farther, as may be required.

It is obvious that, in choosing the correct colours, and repeating the process several times, many colours can be put on; also fixing of the colours under the influence of light, as in photographic pigment printing, may be done. If, for instance, on a sheet of celluloid a red and a yellow graining are printed, so that the two colours partly cover one another, and the sheet is then coated with a layer of blue gelatine which has been rendered sensitive to light by means of bichromate of potash, when it is exposed to light from behind, and developed in the usual pigment process, blue colour will be found on the spots which have remained free of oil colour, less will remain on the yellow spots, the result of which is green; on the red and orange spots, however, no blue colour will remain, by which means a similar effect will be produced as in the example first given.

One can also proceed in the following manner:—

Upon a celluloid sheet is printed a red-and-yellow granulation, so that the two colours fall partly over each other, then the sheet is coated with a layer of blue gelatine, which is made sensitive by means of bichromate of potash; it is exposed from behind, and developed as in the usual pigment process. On the places which remained white, blue will be fixed; on the yellows, correspondingly less whereby, green is produced; on the red and orange colouring nothing at all, whereby a similar effect is produced as in the first example.

Also here, of course, other colours, and in other succession, can be used.

If the layer is to be produced on glass, one prints upon a transferring paper, and the colour is taken over to the glass.

SENSITISING BROMIDE PAPER ON BOTH SIDES.

Mr. W. Friese-Greene points out that hitherto, in the manufacture of sensitised paper, it has been usual to take paper of special make, and to sensitise it by coating the surface with sensitising materials, such, for example, as solutions of silver, iron, or platinum salts. This method of sensitising the paper is expensive and inconvenient, inasmuch as it necessitates a distinct operation.

He applies the sensitising materials to the paper in the course of its manufacture. The two processes, *viz.*, the manufacture and the sensitising of the paper, are thus effected at one and the same time, instead of, as heretofore, at separate times. The parts of the paper-making and sensitising machinery,

between the place where the sensitising materials are introduced and the place where the finished paper is wound on a drum or roll, should be enclosed, and no light admitted, except through red-covered or other non-actinic openings, and any parts of the machinery with which the pulp or paper web comes into contact, after the addition of the sensitising materials, should be made of substances which will not injuriously affect those materials.

The sensitising materials may be introduced into the paper while this is in the state of pulp, and, in this case, he adds them just before the pulp is run upon the wire web or other 'former,' care being taken to thoroughly mix them with the pulp. He prefers, however, to apply the sensitising materials after the paper has 'formed' and has become more or less dry, or, more correctly speaking, when it is still more or less moist. They can be applied to the surface by a suitable spreader before the paper web reaches the winding-up roll. This spreader may conveniently be in the form of a rotating roller, partly immersed in a trough containing the sensitising materials; the 'formed' web is caused to travel over the upper surface of this roller, and is kept in contact therewith by an upper guide roller, so that the spreading roller, as it rotates, becomes coated with the sensitising materials, and transfers them to or spreads them upon the paper. In order to ensure more uniformity in the distribution, one or more other rollers may be placed between the above-described spreading roller and the paper, like the inking rollers of a printing machine.

If it be required to apply the sensitising materials to both surfaces of a 'formed' and still more or less moist web, it may first have them applied to one surface, in the manner above explained, and then the web may be reversed so as to bring the other surface to the bottom, and this surface may then have the sensitising materials applied to it by a similar arrangement of rollers. Or, when both sides of the moist paper web are to have the sensitising materials applied to them, it may be caused to travel, by means of guide rollers, through the sensitising materials in a trough.

ELIMINATING HYPOSULPHITES: MERCIER'S PROCESS.

PHOTOGRAPHIC negatives or prints, says M. Mercier, are usually subjected to a final treatment by a solution of hyposulphite of soda in order to dissolve the argentic salts, which treatment is termed the fixing, after which they are washed for some time in order to eliminate the hyposulphites. Such washing often consumes a considerable time, especially when the treatment with hyposulphite of soda has been incomplete, as the negatives and prints retain in such cases an argentic hyposulphite which is insoluble in water and withstands the action of ordinary washings.

My invention relates to the use of solutions prepared with the aid of iodine or iodides, bromine or bromides, in the following manner, that is to say:—

1. I may dissolve in water alkaline iodides such as iodide of potassium or iodide of sodium. I have discovered that alkaline iodides decompose argentic hyposulphites contained in the negatives or prints as they are withdrawn from the fixing bath, while thus facilitating the washing of the negatives and prints to a far higher degree than alkaline chlorides, such as common salt, which had been heretofore recommended as a dialytic eliminator of hyposulphites.

2. Instead of using alkaline iodides alone, I may use conjointly with them salts having an alkaline reaction such as carbonate of soda, sulphite of soda, sodic phosphates and the like, or an alkali such as potash soda or ammonia. I have discovered that the elimination of the hyposulphites is thus more rapid than with the iodides alone. I often add to the above compounds a small quantity of common salt, which, however, is not indispensable. As a practical illustration of the above indications, I may use a solution containing

about four grammes of iodide of potassium in one litre of water, or I may use the following :—

Iodide of potassium	4 grammes.
Carbonate of soda	1 gramme.
Common salt	30 grammes.
Water	1 litre.

I may substitute for the above alkaline iodides alkaline bromides, but in such cases the elimination of the hyposulphites proceeds more slowly.

Instead of using alkaline iodides or bromides in the solutions above named, I may prepare them directly with bromide or iodine, which method was the first employed by me, the former process having been discovered subsequently after further experiments.

To prepare the latter solutions, I dissolve iodine or bromine in a suitable quantity of water with an alkaline salt, and by preference carbonate of soda. I may use by way of example the following formula :—

Powdered iodine	3 grammes.
Carbonate of soda	30 ,,
Water	1 litre.

To facilitate the solution of the three grammes of iodine, I dissolve them previously in forty grains of alcohol or thereabouts.

I thus obtain a yellow solution which cannot be used forthwith, for it would corrode the photographic image ; it is therefore necessary to wait until it becomes spontaneously discoloured, which requires from one or two days or longer, or it may be discoloured by heating it for a few minutes, or by adding thereto a small quantity of ammonia ; when the solution is discoloured and cool, it can be utilised forthwith.

Colourless solutions of the kind above described may be obtained by adding a small quantity of sulphite of soda, or by using the latter alone in lieu of the carbonate of soda ; but it is preferable to use the carbonate alone, in order to prevent the introduction of sulphurous compounds in the eliminating means.

To use my solutions, the photographic negatives or prints impregnated with the hyposulphite of the fixing bath are slightly washed with water to remove the largest portion of its hyposulphites, they are then immersed in one of my solutions for a short time, varying from five minutes to one or two hours, according to requirements. The negatives or prints may be passed through several similar baths if required, the operation being completed by washing them for a few minutes in clean water.

The efficacy of my process can be readily demonstrated, particularly as regards negatives or prints which have not been left long enough in the fixing bath and are still impregnated with argentic hyposulphite, which is insoluble in water, and it is easy to ascertain when the negative or print contains no more hyposulphite by slightly touching a point of the white parts of the print with a brush previously dipped in a ten per cent. solution or thereabouts of nitrate of silver, when, if there be any hyposulphite left, there is formed a yellow spot at the said point.

PHOTOGRAPHS ON METALS, PORCELAIN, &C.

MR. THEODOR HÄUSERMANN, of Vienna, has patented a process for ornamenting objects of metal, porcelain, or the like, the objects being provided with a coating of chrome glue and exposed to the light and heated to about 300°-400° C. If some parts are to be undyed, these are protected from light by covering them.

The drawings or ornaments are produced by exposure to light of a negative or template pattern of the desired drawing.

At first the object is provided with a coating sensitive to light, for example, chrome blue, then it is exposed to the light, either the whole surface or the part which is not covered; then the parts which are not fixed are removed by washing.

The fixed, but still colourless, parts of the object may then be treated with a solution of water colour (aniline) in order to make them more visible.

This is, however, not essential, it serves only to facilitate the correction and repair of the drawing.

Finally, after the coating has been dried, it is heated to 300°-400° C., preferably by a gas heater, whereby the surface is dyed brown to black.

For obtaining the light sensitive composition he prefers the following proportions:—

Distilled water	100 c.c.
Fish glue or isinglass	60 to 80 grammes.
Ammonium bichromate	3·3 ,,
Chrome alum	1·3 ,,
Ammonia sp. gr. 0·914	4·7 c. c.
Alcohol	4·7 ,,

This mixture is made by dissolving successively with constant stirring:—

Isinglass, with 40 c. c. of water	60 to 80 grammes,
Ammonium chromate, with 40 c. c. of water	3·3 ,,
Chrome alum, with 20 c. c. of water	1·3 ,,

and, while constantly stirring, adding by drops alcohol and ammonia.

URANIUM INTENSIFIERS AND REDUCERS.

The Cresco-fylma Company's method of employing uranium for the above mentioned purposes is described as follows:—

Uranium nitrate, when used in combination with ferricyanide of potash and acetic acid, as is usual in photographic procedure, has the objection that, when there is practically little or no silver reduced by the developer, those parts stain, and render the increase of density and colour so even or technically flat as to be of no great service.

Should this formula (with modifications in the amount of chemicals to suit special purposes) be used, the deposit of uranium is more regular, and increase of range of density or tone much greater, and the results more permanent.

The formula they prefer is as follows:—

	Water	6 ounces.
	Acetate of uranium	120 grains.
Of either	Acetic acid	½ ounce.
	Formic or citric acid	
	Ferridcyanide of potash	50 grains.

To this formula may be added, for toning bromides and transparencies special colours, sulphocyanide of potassium or nitrate of strontium, from five to seventy grains.

Though we may use acetic acid in the above formula in the case of tabloids, this ingredient would be omitted, the other ingredients ground together and mixed with some adhesive substance, such as celluloid and amyl-acetate, which, though containing no water to start chemical action, would be readily dissolved in acetic acid and water.

The negative, positive, or bromide print to be treated is immersed in the above solution, and the increase of density judged by viewing by transmitted

light, and afterwards well washed in water, to which a small piece of carbonate of soda (one drachm in twenty ounces) has been added.

If it is desired to reduce the amount of density, the film is first intensified, and afterwards transferred to the ordinary hyposulphite of soda fixing bath, to which a few drops (one per cent.) of ammonia is added.

PRINTING AND TONING AT ONE OPERATION: SCHOENFELDER AND KEHLE'S METHOD OF PREPARING THE PAPER.

THIS composition consists of the following ingredients, combined in the proportions stated, and which is called 'stock' or 'ground' solution, viz.:—

STOCK SOLUTION A.

Collodion	
Pyroxyline	300 grains.
Ether	1 pound.
Absolute alcohol	,,

STOCK SOLUTION B.

Fifteen grains of a chloride of a metal of the platinum class, such as gold, iridium, rhodium, osmium, palladium, or platinum chloride, said fifteen grains of chloride being dissolved in one and a half ounces of alcohol (forty per cent.).

One and one-half ounces of Stock Solution A are thoroughly mixed with ten drops of Stock Solution B, and the following ingredients are added in the proportions stated, viz.:—

(*a*) Three grains of an organic acid, such as citric, tartaric, or formic acid, &c., which is dissolved before mixing with the other ingredients in three drops of alcohol;

(*b*) Fifteen grains of silver nitrate or its equivalent, first dissolved in fifty drops of forty per cent. alcohol;

(*c*) One and one-half grains of a chloride—such as strontium, barium, or zirconium chloride—dissolved before mixing with the other ingredients in three drops of forty per cent. alcohol;

(*d*) Two drops of a softening chemical, such as glycerine or castor oil;

(*e*) Five to fifty drops of ammonia (according to its strength), and

(*f*) Two to five drops of gold bromide.

The above emulsion is applied to the surface of the material on which the picture or photograph is to be printed.

The surface must be thoroughly dried before using.

After the print has been made it is given a bath in a solution of sodium hyposulphite, one part to fifteen parts of water, in which bath it remains until all superfluous chemicals have been removed from the picture (about five minutes), when it is taken out and thoroughly washed in clean water. The picture is then ready for mounting, and does not require any additional toning (as the toning has been accomplished simultaneously with the printing), and it has a superior finish of a slight bluish tone that will not fade or turn yellow by being exposed to light. By adding ammonia to the emulsion the time of exposure is greatly reduced, and, by the gold bromide, the tone of the picture is given a slight bluish appearance.

In place of Stock Solution A, a solution can be used composed of gelatine one part, and water three parts, in which case the ingredients mentioned under *a*, *b*, and *c* are dissolved in water instead of alcohol.

PRACTICAL NOTES AND SUGGESTIONS OF THE YEAR.

(*Compiled from Various Sources by* THE EDITOR.)

Absorption.—Professor H. C. Vogel has made a series of experiments, concerning the amount of light absorbed by optical glass, for determining the dimensions of the new refractor for the Potsdam Observatory, with special regard to its photographic use. Vogel's observations agree with Eder and Valenta's. Absorption does not increase constantly at the same rate as the wave-lengths diminish. There is, rather, a constant action over a considerable length of the spectrum, and then a noticeable leap about the region of the G and H lines. Further, with certain specimens of flint glass about 15 cm. thick, two bands of absorption were found; a very weak one at $\lambda=437$, and the middle of the other, more definite in character, at $\lambda=418$.

For quickly observing the absorption of the more refrangible rays, H. C. Vogel exposed chloride paper under the specimens of glass. The relative absorption was indicated by the time required for colouration of the paper, and silver chloride was very suitable for the purpose, being especially sensitive to the violet and ultra-violet rays. It was found that flint glass transmitted 0·35 to 0·52, and crown glass 0·59 to 0·60 of the light.

On an average, it may be taken that ordinary light flint and ordinary silicate crown of Jena make possess the following degrees of absorption for various thicknesses:—

Lens thickness in centimetres.	Intensity of transmitted light and units of incident light.			
	With reference to absorption only.		With reference to absorption and reflection.	
	Visual rays.	Most active chemical rays.	Visual rays.	Most active chemical rays.
4	0·93	0·84	0·77	0·69
6	0·90	0·77	0·75	0·63
8	0·87	0·71	0·72	0·58
10	0·84	0·65	0·70	0·53
20	0·71	0·43	0·59	0·35
30	0·60	0·28	0·50	0·23
40	0·51	0·18	0·42	0·15

From this table it follows that the large objective of the new refractor at Potsdam, with an aperture of 80 cm., and thickness of 12 cm., loses 40 per cent. of the chemically active rays by absorption. From absorption and reflection together, 51 per cent. are lost. The intensity of transmitted, compared with incident, light is, therefore, as 49 to 100.

Adhesive for Fabrics and Metals.—Mr. T. Stokoe says: It occurs to me that it may be a convenience to some to know that any fabric of moderate thickness can be securely joined to metal with the solution of gutta percha in bisulphide of carbon, which is used or sold by many shoemakers for joining leather. I have recently hinged the metal divisions of my dark slides to the frame with this material and stout ribbon, and find the joints perfectly strong and firm.

Albumenised Paper, A New.—Drs. M. Jolles and Leon Lilienfeld of Vienna have made a number of experiments to find other substances as vehicles for the emulsification of silver in the manufacture of printing-out papers. Dr. Eder gives some particulars of a new printing surface that is being commercially prepared by them. Their experiments have been with the proteids—especially these obtained from maize and other husked seeds—and they have succeeded in making a good, serviceable emulsion paper, which they consider superior to any prepared with gelatine, egg albumen, or collodion. 'Phosphalbin paper,' or 'protalbin paper' are the names under which the new article is likely to be known. The glaze is rather higher than that of albumen, the gradation of the prints is good, and the shadows are deep and brilliant. With Bühler's sulphocyanide of strontium gold bath the tone is a warm purple violet. The paper is not affected by damp, and the surface withstands mechanical injury as well as that of albumen. It will also bear considerable rubbing with wet fingers without detriment to its high glaze. For coating the paper the proteid emulsion is prepared with alcohol, and the prints should be very stable, as the medium does not contain any sulphur.

Aluminium as a Support for Collotype Plates.—A. Albert suggests the following method of working:—New sheets of aluminium should be cleaned with a mixture of ammonia, 1 part; water, 3 parts; and then well dried with a cloth. If they have been previously used for collotype, they should be freed from the gelatine film by treatment with dilute sulphuric acid 1 : 30, well washed with water, and then treated with ammonia and water, as suggested above. The best substratum is waterglass and beer, without any caustic potash. To coat the plates with gelatine, the aluminium should be laid on plate glass and then coated. It is much easier to print on aluminium plates than with glass, as the metal can be turned back like paper, and it requires less printing. For damping these plates in printing, a mixture of glycerine and water only must be used; no ammonia or hypo should be used, as these attack the metal. Printing from these plates is much easier than from glass, as the ink shows up much better, particularly by artificial light, than on glass.

Alumtypie.—Fleck describes, under this title, an aluminium printing process which is stated to have given the most satisfactory results. It is a direct asphalt printing process, and Fleck states that the asphalt used by him is so sensitive as to give a vigorous print in ten minutes in the sun, which requires no auxiliary exposure or heating. Two etching fluids are used. No. 1 consists of

Hydrochloric acid	25 parts.
Nitric acid	25 ,,
Saturated solution of salt	50 ,,
Strong solution of gum arabic	25–50 ,,

For large prints, 25 parts of sulphuric acid are added to the above. This etching solution is allowed to act for from three to five minutes, the plate is then washed, excess of moisture removed, and the print rolled up with equal parts of printing and litho ink diluted with varnish. The plate is then warmed

and dusted with resin powder, and rubbed over with talc powder, and then etched in No. 2 solution of

Ferric chloride solution (35° B.)	100 parts.
Strong gum solution	10 ,,

Fleck uses the gum solution only as a diluent of the iron. The ink-repelling property of the gum as used for stone and zinc work is replaced much more efficiently by the chloride of iron, which he states he has used for some time for lithographic work on stone. This second etching solution is allowed to act for the same time as the first, and the plate then washed and dried, and treated with the following solution :—

Powdered Syrian asphalt	8 parts.
Chloroform or benzole	50 ,,
Oil of turpentine	50 ,,
Oil of lavender	3 ,,
Dye	0·5 ,,

The dye is used to enable the image to be seen better, and to enable one to judge better of the etching. The plate is prepared for printing, and it will give a long run by using

Water	160 parts.
Phosphoric acid	9 ,,
Gallic acid	25 ,,
Tannin solution (1 : 3)	35 ,,

Anti-halation Backing.—M. Ducos du Hauron suggests the following paste, which, before being applied to the plate, must be heated to 40° or 50° C. :—

Paraffin (solid)	20 parts.
Olive oil	20 ,,
Lamp-black	10 ,,

Dr. E. Vogel points out that, for backing orthochromatic plates, yellow collodion is useless, as this permits a considerable quantity of the green and yellow rays to pass, which may be reflected and cause halation. He suggests the use of the following red collodion, which absorbs the whole of the blue, green, and yellowish-green rays, and only allows the red rays to pass, to which the ordinary orthochromatic plate is not sensitive :—

Acridine yellow	10 parts.
Fuchsine	4 ,,
Alcohol (ninety-nine per cent.)	120 ,,

Filter and mix—

The above solution	20 parts.
Collodion (four to six per cent.)	50 ,,
Castor oil	2 ,,
Alcohol and ether	100 ,,

Anti-halation Paper.—Dr. Precht strongly recommends the deep red issue paper such as is used for making artificial flowers, and he also states that it can be used for dark-room illumination also. The paper, cut to the size of the plates, should be dipped into heavy paraffin oil, and then just dabbed into contact with the glass with the finger. Castor oil may be used instead of the paraffin ; or, in fact, any oil which has the same refractive index as glass, which is about D=1·54.

Artigue's Paper.—Herr Watzek points out that, instead of using gum arabic in the Artigue process, gelatine may be employed, if it is used in a liquid state. The image can be obtained of a finer grain and adheres more firmly. As a suitable formula is recommended:—

Gelatine	40 grains.
Chloral hydrate	25 ,,
Water	100 minims.

By using this, the developer may be employed cold, and hastened by the addition of a little carbonate of potash, and it is only necessary to use sawdust to clear up the whites should they show at all dirty. The surface of the paper seems to have no effect when gelatine is used, and the paper is more sensitive and keeps better than that prepared with gum. It might be possible to replace chloral hydrate with glacial acetic acid or some other solvent of gelatine.

Artigue Process.—To those interested in this mode of printing the following extract from Dr. Eder's recent volume on pigment processes may be of service. According to Duchochois, a similar paper to the Artigue may be prepared by an easily soluble mixture of—

Syrup	20 c. c.
Sugar	10 grammes.
Honey	5 ,,
Gelatine	10 ,,
Water	450 c. c.

The whole is dissolved by heat, filtered, and 150 grammes of lamp-black, previously rubbed fine in alcohol, are then added. The paper is brushed over with this solution, the surface equalised, and the sheets are then hung up to dry. The paper is sensitised by brushing over a two and a half per cent. solution of bichromate of ammonia, and after drying the exposure is regulated by a photometer. The print is developed in cold water with soft brushes.

Astigmatism: Testing a Lens for.—Mr. Ernest Gundlach, the well-known American optician, recommends that, to test a lens for astigmatism, the photographer should take a piece of cardboard about ten inches square, cut with a sharp knife across in the centre of it, the lines or slits parallel with the edges of the sheet and about four inches long and one-eighth or three-sixteenths of an inch wide. Fasten the sheet in an upper corner of a window which is so situated that the cross can be looked at from a point or place as far away as possible, say thirty to fifty feet, and with the sky behind the sheet so that the cross appears white upon dark ground. Now put your camera with the lens on at this place, and focus the cross in the centre of the ground glass, the lens being at full opening. Focus accurately, and then turn the camera until the image of the cross has reached the side margin of the ground glass. Here the cross will appear as sharp as in the centre, without refocussing, if the lens is perfectly anastigmatic and the spherical and chromatic aberrations, as well, corrected in this oblique direction as in the centre or optical axis. But, alas! where is the lens that will stand this severe test? If the lens is an ordinary rectilinear, or symmetrical only, the vertical line of the cross will appear fairly sharp, while the horizontal line is much blurred. This is because the focus of this (horizontal) line is *too short;* the lens is *astigmatic. The difference of the focal lengths of the vertical and the horizontal lines of the cross at a given angle of the field and given equivalent focus amounts to the astigmatic aberration of the lens.* The requirement of a modern anastigmat is not only freedom from astigmatism, but a flat field at the same time; that is, the foci of the two lines of the cross must not only coincide, but also be in the plane of

the central or axial focus. For this the test with the cross should be made on both sides of the ground glass; or, better, the image should move slowly along the plate from one side to the other. Should the image appear less sharp at any point between centre and edge, the defect is due to secondary field curvature.

Automatic Developer.—Signor Nori suggests the following formula, which is said to produce good negatives, no matter what the exposure may have been, and independently of the character of the plate: Heat a pint of distilled water to boiling, and add to it 1¼ ounces of anhydrous sodium sulphite, and 48 grains of caustic lithia, remove from the fire, and stir till all is dissolved, and add 10 drops of a saturated solution of potassium bromide; allowed to cool, decant from any precipitate, and add 36 grains of hydroquinone and 24 grains of para-amido-phenol, and, when all is dissolved, pour into bottles, which shall be kept quite full. This developer may be used over and over again, and, if the old acts too slowly, from one-fifth to one-quarter of fresh developer may be added.

Backing Mixture.—The following is Mr. J. Pike's formula:—

Gun-cotton	1 ounce.
Methylated spirit	12 ounces.
Methylated ether (·735)	36 ,,
Magenta dye	a sufficiency.
Matt varnish	24 ounces.

Backing Plates.—The following is Mr. J. H. Baldock's formula:—

Transparent celluloid	80 grains.
Acetone	3 ounces.
Amyl-acetate	1 ounce.

Mix and allow the celluloid to dissolve.

This is the foundation of the backing. It may be coloured yellow, orange, red, or black, or a mixture of yellow and red, or orange and red, could be used, by dissolving about two or three grains of those aniline colours in the solution of celluloid.

The coloured solution thus obtained is then flowed over the plate, as was done in the samples sent, or brushed quickly over with a flat dusting brush, laying the plate flat on a piece of pure white paper. When quite dry (if put on over night it will be dry in the morning), it can be peeled off in one piece by first running the point of a penknife along the edge of the plate. It should be applied freely, as the thicker the film the more easily it comes off; but, should it tear and little pieces be left along the edges, do not try and remove them till the plate is fixed and dry, they will do no harm.

Obviously, this cannot be used for films.

Backing Sheets.—A writer in the *Deutsche Photographen Zeitung* stated that he has found that good anti-halation backing sheets can be made by coating stout paper with a solution of ten parts of gelatine in seventy-five parts of water, and adding sixty parts of glycerine, and then dissolving in the mixture sufficient red dye such as aniline red to give it a good deep colour. Such sheets are always sticky and merely require squeegeeing into contact with the back of the plate, and they can be readily stripped off before development. If they get dry and hard through constant use, rubbing them over with glycerine will render them fit for use again.

Blackening Aluminium.—*La Photographie Française* recommends the following process: The metal is first washed with soda and water to remove any trace of grease. It is then coated with albumen, prepared by beating the white of a fresh egg to froth and allowing it to settle. As soon as the film is dry the metal is gradually heated until quite red hot. A crust is formed upon the surface, and, upon its removal, the metal will be found with a deep, black surface, capable of resisting any acid, and so tough that it can only be removed with a file.

Blackening Brass.—Fleck recommends the following method of blackening brass. Clean the brass well, and dip into a mixture of—

Water	100 parts.
Ferric chloride solution (40° B.)	50 ,,
Yellow prussiate of potash	5 ,,

Then wash in water, and heat and rub over with linseed oil, and polish with a soft cloth.

Blackening Iron and Steel.—To give a matt black coating to iron and steel, according to the *Revue Suisse*, the objects, well cleaned, should be immersed or painted with a mixture of—

Mercuric chloride	4 parts.
Cupric chloride	2 ,,
Hydrochloric acid	12 ,,
Alcohol	10 ,,
Water	100 ,,

They should then be dried, and allowed to hang for half an hour in boiling water. If the colour is not dark enough, the operation may be repeated.

Blackening Wood. — M. Koninck suggests the following method of blackening wood, which has the advantage of resisting acids and alkalies :—

A.

Cupric chloride	75 parts.
Sodium chlorate	67 ,,
Water	1000 ,,

B.

Aniline hydrochlorate	150 parts.
Water	1000 ,,

Paint the wood with A and a short time after with B, and remove with a damp cloth the yellow powder that forms. Repeat this operation every day till the desired colour is obtained, and then rub the wood with vaseline or linseed oil. By using potassium bichromate instead of the soda salt a good black colour is obtained at once.

Blue Prints on Linen.—Tranchaut, in his little work, *La Linotypie*, which deals with the making of prints on material, and not with the linotype machines gives the following method of sensitising linen for blue printing. The well-washed linen should be first immersed in a one per cent. solution of hard gelatine, and dried, and then sensitised with one of the following mixtures : —

A.

Ammonio-citrate of iron	27 parts.
Water	100 ,,

B.

Ferridcyanide of potassium	23 parts.
Water	100 ,,

Add A to B, and filter, and keep in the dark. Or the following may be used :—

A.

Citric or tartaric acid	26 parts.
Water	100 ,,

B.

Ferric chloride	20 parts.
Water	100 ,,

C.

Ferridcyanide of potassium	22 parts.
Water	100 ,,

D.

Ammonia	about 40 parts.

Add A to B, and then D, gradually shaking between each addition, and, finally, add C in the same way, and then filter the mixture. The linen can be sensitised by brushing the solution on with a water-colour brush. The latter mixture gives a more sensitive preparation than the former.

Blue Tones on Celloidin Paper—Lainer describes the following method of preparing a bath to give blue tones on celloidin paper, which would, doubtless, also answer for gelatine and collodio-chloride paper. Two grains of ammonium sulphocyanide are dissolved in 10 c. c. of water, and heated almost to boiling point, and then 30 c. c. of a one per cent. solution of neutral gold chloride should be added, in quantities of 3 or 4 c. c. at a time, and, after each addition, the solution heated till the red colour first formed disappears. The solution should be allowed to cool and filtered, and kept for stock. To every 100 parts of a five per cent. solution of ammonium sulphocyanide five parts of this solution should be added. In this bath the print will assume a pure, soft blue tone in four or five minutes and this can be seen on examining the print by transmitted light as usual. The use of a fixing bath with some sulphite in it will tend to give pure whites.

Celloidine Paper, the Preparation of.—Belitzski gives the following method of preparing celloidine paper :—

Strontium chloride (crystal)	30 parts.
Lithium chloride (anhydrous)	10 ,,
Distilled water	62 ,,

When dissolved, add—

Glycerine (by weight)	160 parts.
Absolute alcohol (by weight)	218 ,,

To make the collodion :—

Raw celloidine collodion (three per cent.)	400 parts.
The above solution	30 ,,
Silver nitrate	12 ,,

The silver should be dissolved in 16 parts of water by the aid of heat, and mixed with 30 parts of absolute alcohol, before adding to the salted collodion. Finally, to the collodio-chloride emulsion should be added—

Saturated alcoholic solution of citric acid	12 parts.
Ether	50 ,,

All these should be weighed, and not measured out. If the paper is to be kept, it should be brushed over on the back with a two per cent. alcoholic solution of citric acid. The paper is ready for use in half an hour.

Collodio-Chloride Emulsion.—Vollenbruch suggests the following method of making a good collodio-chloride printing-out emulsion :—

No. 1.

Citric acid	200 parts.
Distilled water	280 ,,

Dissolve by the aid of heat and add—

Lithium chloride	80 ,,

Allow to cool and filter.

No. 2.

Silver nitrate	560 ,,
Glycerine	200 ,,
Distilled water	560 ,,

Shake occasionally till dissolved. To every 1300 parts of a two and a half per cent. cellodine collodion add 13 parts of No. 1 and 92 parts of No. 2.

Collodio-chloride Paper.—In Eder's *Jahrbuch* Herr Haimeke gives the following method of preparing celloidine paper. Baryta paper, as sold by Rives, should be used as a support. The particular formula which he recommends for the emulsion is—

I.

4 per cent. celloidine collodion	670 parts.
Ether	70 ,,

II.

Lithium chloride	1·8 parts.
Strontium chloride (cryst.)	2 ,,
Citric acid	4 ,,
Distilled water	10 ,,
Alcohol	65 ,,

III.

Silver nitrate	22 parts.
Distilled water	24 ,,
Alcohol	150 ,,

In Solutions II. and III. the salts should be dissolved in the water by the aid of heat, and then the alcohol added. The silver solution should be added to the collodion, and then the chlorides, shaking well all the time, and a little glycerine and castor oil should be added to the emulsion. The above formula is suitable for winter work, but in summer it should be somewhat thinned by a mixture of 2 parts of alcohol and 1 part of ether, the exact amount being determined by experiment, the main idea being to obtain a collodion which will flow easily.

Collodio-chloride Prints, Unequal Toning of.—The Editor of the *Photographisches Wochenblatt* recommends an inquirer to soak his prints in a bath of equal parts of methylated spirit and water, and then to wash them if they refuse to tone properly. This defect is due to the horny condition of the collodion. The glycerine and soluble salts are present in minute particles in the film, which resembles a sponge. The film contracts with age, and the

particles are then driven out and absorbed by the paper. In its horny condition the film will not absorb water, and the dilute alcohol restores it by opening the pores and thus enabling the toning bath to act. Finished prints that have been insufficiently toned may be treated in this manner and further toned in the sulphocyanide or combined baths.

Combined Gold and Platinum Toning.—Professor A. Lainer gives the following directions for toning matt celloidin paper. The process gives warm, pure black, brown-blue, or violet-black tones, and likewise a peculiar grey-black with very pure whites. It is very essential that the hands should not come in contact with the fixing bath whilst toning, as the slightest trace of hyposulphite produces stains and markings. The process should be studied by toning prints singly to arrive at the method of obtaining special tones, printed instructions being of little value for this purpose.

1. The pictures should be fully printed and immersed singly in a dish of water. Not more than ten at a time should be treated, and they should be washed for ten to fifteen minutes in two changes of water.

Too much washing, warm water, salt, and hydrochloric acid prevent subsequent direct toning with platinum. If the washing is omitted, and the print placed in the platinum bath direct, without gold toning, sepia tones result after fixing, which may be carried to the black stage in the clearing bath, but the platinum bath rapidly discolours.

2. The washed prints are placed in a gold bath for a few seconds until they assume a brown tone.

Stock solutions :—

A.

Acetate of soda	10 grammes.
Borax	10 ,,
Water	1000 c. c.

B.

Chloride of gold	1 gramme.
Water	100 c. c.

Mix, before use, 100 c. c. of A and 2 c. c. of B. After toning, lay the print in water.

This gold bath is not absolutely necessary, but it is not without influence upon the purity of the final tone, and should never be omitted for grey black. If warm brown or brownish-black tones are wanted, the prints may be transferred to the platinum bath after quickly rinsing in water.

3. The prints are placed singly in the platinum bath and toned to the dark violet or blue-black stage.

The platinum bath may be made as follows :—

Water	100 c. c.
Phosphoric acid	2·5 ,,
Ten per cent. solution of potassium chloro-platinite	2 ,,

If the bath is fresh and good, the prints tone immediately; but, if the prints do not change rapidly from brown to violet, a new bath should be used, and the dish cleansed thoroughly. The slightest trace of hyposulphite spoils the bath, and, the prints will not go beyond the red-violet stage. Short immersion in this bath will produce warmer tones.

4. After the platinum bath, the prints are washed for a short time to remove the phosphoric acid, and then transferred to a ten per cent. fixing bath of hyposulphite of soda. It is very important to use a fresh fixing bath, and, when large numbers of prints are treated, to renew the bath frequently, and not fix all in one bath.

After fixing, the prints are washed for twenty minutes in four or five changes of water. At this stage the tone is usually brown, and, if satisfactory, the prints should at once be mounted.

If pure black or grey to blue-black tones are wanted, the prints should be washed, for five minutes only, in several changes of water, and then transferred to the clearing bath.

5. The clearing bath consists of—

Water	1000 c. c.
Sulphocyanide of ammonium	100 grammes.
Chloride of gold and potassium solution (1 in 100)	20 c. c.

The clearing bath may be used repeatedly, but must be kept clear by filtration.

The clearing bath equalises the tone of the prints, and, according to the length of immersion (from five to fifteen minutes), the final tone may be modified.

Copying Maps.—W. Cronenberg describes his method of reproducing maps and similar subjects, in which it is necessary to render the finest detail correctly. A wet-collodion negative is made upon plate glass, and, after thorough washing, coated with bichromated gelatine, and dried at a moderate heat. The negative is laid face downwards upon a black cloth, and exposed to light from one to three hours, according to density. The plate is then washed to free it from bichromate, hardened in an alum bath, again washed, and allowed to dry spontaneously. It is then etched with a solution of glycerine, and a perfect print is taken from it in transfer ink upon transfer paper. The print is tranferred to stone, and reproduced by lithography. The transfer may be omitted if collotype prints are preferred.

Copying Prints, Drawings, &c.—The following hint from *Die Photographie* may be found of use where torn or folded printed matter has to be copied, and mounting and rolling is inadmissible. A sheet of glass or metal is given a somewhat thick coat of gelatine, and before use it is brushed over with water and glycerine in equal parts. The superfluous moisture is removed with blotting-paper. The prints are slightly moistened on the back, and pressed into contact with the coating of gelatine by means of a roller or the palm of the hand. After the photograph has been made, the prints can easily be stripped from the support, and the coated plate may be reserved for use on subsequent occasions.

Direct Photo-lithography.—Herr Fritz describes the following method of printing direct on to a stone. Good even stones, without chalky or ferruginous spots, should be chosen, and well polished, and then gently heated and flowed over with lukewarm water. The sensitive mixture is composed of 100 parts of good Cologne glue, which should be allowed to swell for twelve hours in water, and then melted in a water bath, and to this should be added a solution of 6 parts of dried egg albumen in 60 parts of water. To every 60 parts of this mixture should be added 500 parts of water and 6 parts of a ten per cent. solution of ammonium bichromate, and then the whole filtered. The warm stone is coated with this mixture in the dark room, then whirled till it is quite dry. The exposure is, according to the density of the negative, for from half to two minutes in the sun, or from five to ten minutes in the shade. After exposure, the stone is inked up with a mixture of 20 parts of Venice turpentine, 20 parts of litho ink, 5 parts of asphalt, and 3 parts of yellow wax. These ingredients should be rubbed up together, melted on the fire, and diluted with turpentine to a syrupy consistence. This mixture is spread over the whole of the stone with a soft pad, the stone then laid in water, and the parts not affected by light will soon begin to dissolve off,

and it may be fully developed with a tuft of cotton-wool; then the stone should be gummed and allowed to dry spontaneously. It may be afterwards treated with water, etched, and will stand all the necessary and usual operations for preparing a perfect stone.

Dry Developer.—M. Bani, of Pisa, recommends the following dry-powder developer for tourists:—

A.

Metol	15 parts.
Hydroquinone	40 ,,
Eikonogen	25 ,,
Boric acid	10 ,,

Mix well, and keep in a yellow glass bottle, hermetically sealed.

B.

Sodium sulphite	100 parts.
Borax	25 ,,
Sugar of milk	25 ,,

For use, mix—

Powder A	2 parts.
Powder B	4 ,,
Water	100 ,,

For bromide paper, dilute this with an equal quantity of water.

Fish Glue in the Gum-bichromate Process.—Herr Raphaels suggests the use of Le Page's fish glue as a substitute for gum arabic in this process as follows:—

Fish glue	5 parts.
Water colours (in tubes)	10 ,,
Potassium bichromate (sat. sol.)	25 ,,

The mixture should be spread very thinly on paper, and when dry it should be printed as long as gelatino-chloride paper, and then developed in cold water. If the mixture is kept a week before use, the exposure is considerably reduced, but an old mixture gives flat prints. Rough paper only should be used, and with pyramidal grain paper exquisite half-tones are obtained; a thin coating gives flat prints, a thick coating harsher prints.

Grainless Emulsion.—MM. August and Louis Lumière contribute to Eder's *Jahrbuch* a paper on this subject, with special reference to Lippmann's process, and further researches have proved that their original method, suggested in 1892, is satisfactory, the great point in it being the admixture of gelatine both with the silver and the bromide solution, and the use of these in a very weak solution. The formula they recommend is as follows:—

A.

Water	200 parts.
Gelatine	10 ,,
Potassium bromide	3·5 ,,

B.

Water	200 parts.
Gelatine	10 ,,
Silver nitrate	5 ,,

The temperature of the solutions must not exceed 40° C. A sheet of glass should be coated with the above emulsion, laid on a slab of marble to set, and

then dipped in alcohol, and the plate washed and dried. In order to increase the sensitiveness of such plates, MM. Lumière state that Valenta's method of using sodium sulphite has not succeeded in their hands, but suggest the bathing of the plate in a half per cent. solution of silver nitrate, to which acetic acid has been added. The plates should then be dried and allowed to remain for some hours at a temperature of 25° C., during which time an increased sensitiveness equal to sixty times often ensues. The plate must again be washed and dried. Formic acid may be used instead of the acetic acid, but it is rather more difficult to control. For Lippmann's process it is, of course, necessary to add some dyes, such as erythrosine, cyanine, or methyl violet, to increase the colour sensitiveness.

Ground Glass.—Rev. Arthur East says that there often appear in photographic papers articles on *substitutes* for ground glass, it being little understood, probably, what an exceedingly easy process it is to make the very thing itself; and that starch, arrow-root, and suchlike things are almost, if not, quite as much trouble to utilise (and of not one-tenth the beauty and durability) as ground glass at home.

The following plan may, therefore, be acceptable:—

Take a clean negative glass of any size, and lay it on a flat, hard surface, such as a board or stone slab, sprinkle on this a pinch of emery powder, No. 1 (flour of emery will *do*, and do well, but the next quality, coarser, works more quickly). Lay on this a piece of broken glass about an inch square or thereabouts, and *moisten* the emery with a little water (do not use much so as to let it get 'sloppy,' and work all about).

Now work round and round all over the negative glass with the moderate pressure of two or three fingers until the gritty sound begins to go, which means that your emery is getting ground too fine (this will be in about a minute or two). Put on another pinch of emery, and work as before; in about ten minutes rinse your plate under the tap, and you will find probably with your finely ground surface a few 'islands' looking shiny, return the plate to the board, and work these patches out, and you will find a surface ground as finely as any you can buy, and there is no difficulty whatever in getting a perfectly even surface free from any scratches or defect whatever.

Any ironmonger will supply the emery, a pennyworth by post if you live 'beyond the region of lamp-posts,' and even the ordinary domestic knife powder will do, but it is too fine and works too slowly, and is inclined to be gritty and make deep scores in the surface of the glass.

If an extra finely ground surface is required as for a focussing glass, it only means rather longer grinding, and perhaps a little flour of emery to finish with; but the whole process can easily be done with one quality of emery, of which the best is probably the No. 1. If the surface of negative glasses were perfectly flat, it would be possible to grind two together, but the surface is never flat, and a small piece of glass is best to grind with. Some samples of glass are harder than others, and take rather longer to finish.

Halation.—Dr. E. Vogel discusses the merits of certain kinds of backing that are used to obviate this evil. It is impossible to counteract it completely, as there is not only reflection of light from the back of the plate, but a certain amount of diffusion of light in the gelatine film itself. A very effective backing is a mixture of lamp-black and castor oil, or, as recommended by Cornu, oil of cloves, turpentine, and lamp-black. These are perhaps the most effective backings, but they are so objectionable in practice, that they cannot be used when travelling, and to prepare or clean such a backed plate is one of the dirtiest operations in photography. Stolze recommended collodion stained with aurine. 100 grammes of aurine are dissolved in 200 c. c. of warm alcohol, and filtered. 100 c. c. of this solution are added to 300 c. c. of two per cent.

raw collodion and 4 c. c. of castor oil. This backing of yellow collodion is very effective and convenient, but does not protect orthochromatic plates as much as might be desired, as only the blue and part of the green rays are absorbed by it. For orthochromatic plates the collodion should be stained with other dyes. Erythrosine is a good dye for the backing when the plates used are sensitised with erythrosine; but Dr. E. Vogel specially recommends a mixture of acridine yellow and rubin (fuchsin). Dissolve 10 grammes of acridine yellow and 4 grammes of rubin in 120 c. c. alcohol (ninety-nine per cent.). Filter the solution, as the acridine yellow usually contains a considerable admixture of dextrine. Take 20 c. c. of the solution of dye and add it to 50 c. c. of a thick four per cent. collodion, and 2 c. c. of castor oil. The stained collodion thus prepared should be made up to 100 c. c. by adding alcohol and ether in equal quantities. This red collodion also makes a good coating for dark-room windows, or electric lamps.

Halation and its Remedies.—The following communication from Mr. George Bankart is of especial interest:—

The subject of halation seems to be occupying some little attention just now, and as I have had considerable experience, of a gratifying nature, in respect of a remedy for it, I venture to offer a few remarks on the subject.

The solution I use for backing plates has been in constant use for six or seven years, and I am so satisfied with it that I would not change it for any other published process. I have given it the crucial test of *two hours'* exposure upon dark interiors of churches and cathedrals, with brilliant windows staring straight into the lens, without the least indication of halation, and the same tests, with shorter exposures, of twigs and leaves against a bright sky, perfectly clean and bright, and I do not think we need ask for any test of a more severe nature.

It appears to me that the desirable qualities of a 'backing' solution for plates are:—

(1) Ease of application, with speedy drying, so that the plate may be put into the dark slide, soon afterwards, without sticking to, or making a mess with, its interior.

(2) Good keeping qualities (if the plates are stored away) without detriment to the film, and freedom from abrasion in the form of 'dust,' which is apt to get on the surface and cause pinholes, by holding back the action of light.

(3) Ease and celerity of removal, sufficient for development purposes, so that detail and and density may be properly judged.

(4) That the colour quality of the backing and its 'optical contact' shall be as perfect as possible.

I claim all these points for my 'backing' solution, of which the following may be accepted as a good formula:—

Benzole, in which is dissolved sufficent *pure* indiarubber to give it a mucilaginous or sticky quality (don't try 'vulcanised' rubber, because it is insoluble), this is to make it tenacious to hold the *powdery* colouring matter, which gives body to it, and to prevent it chipping off in dust under ordinary transit in the slides. To this solution add finely powdered 'asphaltum' until it is the consistency of *thinnish treacle*, so that it can be poured out of a bottle, and spread easily with a flat camel's-hair brush.

Let me say, first, that the dark brown colour of 'asphaltum' is very absorbent of such rays as pass through the gelatine film, and (what is considered of some scientific importance) that the 'index of refraction' is said to be nearly the same as that of glass.

Now for the methods of application, and removal, which are the practical points of most interest to operators. I work on '11 × 9' plates, and there-

fore the method of work may be taken as a fair criterion; users of smaller plates will find it still easier.

Cover the working bench, or table, in front of the light of dark room, with sheets of blotting-paper, on which to lay the plates, face down, as coated, and, in front of operator, lay a square of *black*, soft material, such as velvet or mackintosh cloth, on which to lay, *face downward*, the plate to be 'backed' as the black throws up the white square of the plate and renders the edges distinctly visible.

From the bottle of backing solution pour a small pool into the *centre* of the plate, and spread it as *quickly as possible* to the corners and sides of the plate with the flat brush, working it across and across to get evenness as long as the solution will *allow* you to do so, as it sets rapidly. Do not use more solution than is absolutely necessary to cover the plate easily, and the quantity to pour on will soon be arrived at by experience.

Lay aside this plate on the blotting-paper, face downwards, and proceed with others in the same way. By the time six have been coated the first is dry enough to go into the dark slide, but may still be 'tacky,' and it may be best to lay a sheet of tissue or other thin paper over the back.

My plan is to 'back' a number at once—never less than a dozen plates, sometimes six dozen—and to store them away in grooved boxes.

If wanted for travelling purposes, I put them in grooved boxes in pairs (face to face) for twelve hours or so to harden. Then they are quite firm, and will not stick to anything, and can be 'packed' in any way desired.

Some one may say, 'What a nasty mess to use!' If you stick your fingers into it, it is nasty; but if you do the work cleanly, and only touch the solution with the brush, it is perfectly clean and easy to manipulate.

Having exposed your plate, you now want to *remove* the backing *before* development, as nothing can be seen through it against any dark-room light. I know some users who fail to satisfy themselves, and make a mess of getting it off. Do not attempt it by 'solutions' of any kind. Lay the plate, *face downwards*, on a sheet of clean blotting-paper, take a *sharp* carpenter's chisel, (one of an inch and a quarter or an inch and a half is a good size to use for a large plate, or a one inch for smaller ones), commence at one corner, and, with sharp edge, push the film of backing off *in the direction of the centre of the plate*, just as if you were 'planing' it off. Keep the blotting sheet turned round as you proceed till you have been all over it, then sweep the stuff off into a spare plate box, wipe the *back* of plate well with a duster, and it is clean *enough* for *all purposes of development;* and what slight remains of solution is left on will do no harm to the developer.

The chief point of success in this part of the work is to have your chisel *as sharp as possible*, and take *care of your fingers* in using it If the stuff is properly made, it scrapes off the plate with a sort of 'cheesy' consistency in 'flakes,' not in splinters or powder, and if preserved, and the operator studies economy very closely, it can be redissolved, in fresh benzole and rubber, and used over again indefinitely. The celerity of removal is such, with a good chisel, that I can clean off the backing from a dozen plates quite as quickly as I can coat them, and I think that is quickly enough for anything.

There is a slight sticky residue left on the plate, and I find the easiest method of removing it is, after the plate has been fixed in hypo and alumed, to rub the back, whilst still wet, with a piece of rag or tow and some powdered pumice stone, and swill the residue off under the tap. Dry the negative as usual, and, if any slight residue is left on the glass, a rag moistened with benzole will remove every trace, and leave the plate clean.

The subject of halation does not end with prevention by 'backing' of the faults so glaringly visible in an unbacked negative; there is an inner and subtle quality about the *definition all over* a properly backed plate which can only be appreciated by those who have used 'backed' plates under every kind of

circumstance, and it is a cure for the general haziness and indefinite quality of definition known as over-exposure, which is practically a kind of halation of *every overlapping portion of detail* in the picture. Taking 'landscape' as an instance, where there are considerable varieties of distances, it will be found that over-exposure causes them to blend into each other at the edges, and is really halation of such lines, but backing the plate preserves these edges even in the most delicate gradations, and so preserves the over-exposed plate from the loss of these definitions; in other terms, it enables longer exposures to be given with impunity, and without loss of the delicate gradations which would be hopelessly degraded in an unbacked plate, and therefore is of immense importance in preserving *the purity of gradation of tone* in any photograph, and especially so in architectural work and interiors.

Now, I do not make this 'backing' solution myself, I have plenty else to do, but I got my local chemist here to make it for me in the first instance, and he has experimented largely with materials, and his present make of solution is a considerable improvement upon my own as originally tried. His additions and improvements are his own trade secrets, but I can strongly recommend any one to give it a trial.

The solution can be 'tempered' in such a way (to the desire of the user) that it will either dry very rapidly (two to three minutes) or, if the operator is not in a desperate hurry, it can be made to dry more slowly, say, ten to fifteen minutes, and is then more easily manageable in coating the plate, and it will dry with a more even and smoothly surfaced face.

The chief point to bear in mind as to comfort in using it is the method of removal by the sharp carpenter's chisel. It *must* be kept *very* sharp to be effective, a rough-edged chisel does not clean the glass so perfectly, and 'rags' up the coating into small bits instead of broad 'flakes.' I can only say to your readers, 'Try it,' and I hope you will not be disappointed.

I have no interest whatever in the sale of the stuff, but it can be got at a very reasonable price, in bottles, of any size desired, from Mr. Joseph Young (photographic chemist), Gallowtree-gate, Leicester, and orders should state whether it is desired to dry rapidly or moderately so.

Halation: Preventives of.—V. Teran in the *Photo-Gazette* writes: A method of coating the back of the plate with a substance capable of absorbing actinic rays has been recently advanced by M. Mussat, and is deserving of more than passing notice. M. Mussat makes use of gelatine rendered insoluble by means of formalin. With this insoluble gelatine he prepares films, which are applied to the back of the plate and which can afterwards be easily removed. His mode of procedure is as follows: The gelatine is softened in cold water, and then dissolved by placing the vessel containing it in a salt bath; some glycerine is then added, together with some finely ground red ochre. Suitable proportions of these substances are:—

Gelatine	15	parts.
Water	100	,,
Glycerine	12	,,
Red ochre	15	,,

The mixture is shaken till thoroughly mixed, and, whilst still hot, is poured on to a glass plate previously cleaned and talced. A more even coating is obtained if the glass is previously warmed. The gelatine will set in a few minutes, and the plate is then placed in a bath of commercial formalin (containing 5 parts of formalin in 100 parts of water) for a quarter of an hour; it is then washed and dried. When thoroughly dry, the film will easily detach

itself from the glass. To use these films, they are given a thick coating of an adhesive containing—

Gum arabic	75 parts.
Glycerine	12 ,,
Water	125 ,,

A little salicylic acid may be added if it is desired to keep the mixture very long. After having been thus stripped and coated, the film is applied to the back of the sensitive plate (of course, in the dark room) and the plate stood up to dry. The plates can be kept when once prepared in this manner and are ready for placing in the dark slides. Before commencing development, the plate is placed in water, when the film will detach itself in a few seconds. If removed with care and dried, it can be used a second time. The author of this method has obtained excellent results with plates prepared in this way. The obvious advantages are, that it is very handy, and does not stain either baths or fingers; but there seems to be some difficulty in employing it with plates of fairly large size. Even with plates 13×18 centimetres (7×5 inches approximately) difficulty was experienced in securing perfect contact between the film and the glass—a condition which is quite indispensable for counteracting halation.

For large-sized plates we have seen a black matt varnish (obtainable at all oil and colour merchants) used with success. It dries instantly. Before commencing development it must be removed with a pad moistened with alcohol.

It is, however, much preferable to use a backing mixture recommended by M. Drouet, the formula for which is as follows. 100 parts of red ochre are mixed with 50 parts of dextrine, both dry; the whole is finely powdered, and 50 parts of water and 5 parts of glycerine added. An antiseptic is added if it is wished to keep a large quantity, but the preparation of the mixture is so simple that it may be freshly made for each lot of plates to be backed. It is easily spread on the back of the plate with a flat brush. Before development the coating can be removed by simply washing the plate in a dish or under the tap.

Home-made Lantern Plates.—Eckhorst, in *Der Amateur Photograph*, recommended the following method of making lantern emulsion. Heat in a water bath to not above 50° C. the three following solutions :—

No. 1.

Heinrich's hard gelatine	5 grammes.
Distilled water	40 c. c.
Alcohol (40°)	10 ,,
Ammonium bromide	7 grammes.

No. 2.

Heinrich's hard gelatine	5 grammes.
Distilled water	40 c. c.
Alcohol (40°)	10 ,,

No. 3.

Silver nitrate	11 grammes.
Distilled water	12 c. c.

Ammonia, *quant. suff.*, to dissolve the precipitate first formed. Solutions Nos. 2 and 3 are mixed together, and then in the dark room No. 1 is to be added, the emulsion well shaken, and poured out into a flat dish to set. It should then be cut up into strips, washed for eight to twelve hours in frequently changed water, collected on a filter, pressed, and dissolved at 50° C., and coated on glass in the ratio of 8 to 10 c. c. for a 13×18 cm. plate.

Incandescent Light and Gas Chimneys.—Dr. H. W. Vogel gives some particulars of a new incandescent gas mantle and a new chimney. The new mantle gave the following results as compared with the Auer light:—

Date.	Pressure.	Temperature.	Gas per Hour.	Intensity. Hefner Candles.	Gas per Hefner Candle.
New light, 15, 2, 1897.	47 mm.	12° C.	133·3 l.	95·74	1·393 l.
Auer light, 29, 9, 1895.	48 ,,	18° ,,	126·60 ,,	60·44	2·9 ,,

The new mantle not only gives more light, but is more economical, the consumption of gas per Hefner candle (=1·1 standard candle) being only about one-half. The new chimney is made by Schott & Genossen, of Jena, and is fireproof. Some minutes after the gas had been lit the chimney was sprinkled with cold water, and remained sound. A new feature in the construction is the arrangement for supplying air. At the height of the flame there are holes in the side of the chimney, and the gallery upon which the chimney rests is closed. Dr. Schott finds that the light is increased ten per cent. by this arrangement, but Dr. Vogel differs from him, and affirms, as the result of comparative experiments, that the amount of light is the same.

Intensification.—Paul V. Janko has been determining the various degrees of intensity given by the best known intensifiers, and has drawn up the following table.

Bleached in	Blackened by	Ratio of Intensity
Cupric Bromide	Metol	15 : 14
,,	Hydroquinone	15 : 13
,,	Pyrogallol	15 : 12
,,	Silver nitrate	15 : 8
—	Mercuric iodide (Edwards)	15 : 10
Mercuric Chloride	Sodium sulphite	15 : 14
,,	Ferrous oxalate	15 : 13
,,	Hydroquinone	15 : 12
,,	Hyposulphite, or with ammonia	15 : 11
,,	Ammonia	15 : 10
,,	Ammonia, the plate being dried before blackening	15 : 8·5
,,	Ammonium sulphide	15 : 7
—	Uranium	15 : 6

The uranium intensifier gives the greatest increase, next ammonium sulphide, a result which agrees with practice.

Iodine as an Accelerator in the Hydroquinone Developer.—M. Cousin states that the addition of iodine in small quantities to the hydroquinone developer gives much better blacks on bromide paper, and, in large quantities, makes the image appear more quickly, and gives much flatter results. The iodine water is made as follows:—

Potassium iodide	5 parts.
Iodine	1·5 ,,
Water	15 ,,

When dissolved, make up to 250 parts with water. The particular developer he recommends is :—

Hydroquinone	1 part.
Anhydrous sodium sulphite	4 parts.
Saturated solution of soda carbonate	10 ,,
Ten per cent. solution of potassium bromide	3 ,,
Water	100 ,,
Iodine water as above	3 ,,

Labels on Glass.—To write on glass, a mixture of two parts forty per cent. water glass, and one part of caustic soda should be used with a steel pen, allowed to nearly dry, and then dusted with the desired colour, such as lamp-black, barium sulphate, &c.

Lithographic Ink.—The following receipt is given for Lemercier's ink :—

Yellow wax	4 parts
Mutton fat	4 ,,
Marseilles soap	12 ,,
Shellac	6 ,,
Lamp-black	1 ,,

to be well mixed warm. Rub down in a little distilled water for use.

Mechanical Intensification.—It was recently pointed out before the Société Française de Photographie that, if a film be treated with formalin after development, and then washed and placed in alcohol, it will contract more or less according to the strength of the alcohol and the duration of the immersion, and that by this contraction the negative is intensified. It is suggested that ninety-five per cent. of alcohol be used, to which forty per cent. of glycerine has been added. If the contracted film be placed in water, it will absorb the same, and extend to its original size and intensity. It has, of course, long been known that a film which has been allowed to expand in stripping with hydrofluoric acid gets thinner, but this is the first time that a contraction and intensification has been observed.

Mercury Toning.—Mercier pointed out, in his well-known work, *Virages et Fixages*, that gelatine and collodio-chloride prints can be partially toned with mercuric chloride with success. A writer in the *Bulletin de la Société de Bourgogne* now points out that such a toning process is extremely useful when the highlights are slightly yellowed. If the prints have been toned with gold to a purple, they turn to a fine carmine. The procedure is merely to immerse the print, well washed after toning and fixing, in a bath composed of—

Mercuric chloride	1 grain.
Salt	20 grains.
Water	8 ounces.

It is stated that the results thus attained are quite stable after washing without any fixing.

Metol Developer without Alkali.—Kastner states that, if metol is used without any alkali, all plates will give absolutely clear glass, and that plates which have received various exposures may be developed in from ten to twenty-five minutes, with all details, with perfect immunity from fog. The developer may be repeatedly used, and gives prints on bromide paper with blacks equal to platinotype.

Mounting.—The following is given as an effective style by N. Ley: After stripping glazed gelatino-chloride prints from their supports, they are

trimmed to the required size. An oval or other suitable shape is cut out of a piece of matt celluloid, and two wooden blocks are prepared, one the shape of the aperture and the other the shape of the mask. The sheet of celluloid is laid upon the back of the print, and the shape of the aperture is traced upon it in pencil. This is then covered with the block of corresponding shape, and the margins of the print pasted. The mount having been previously prepared, by pasting upon it a piece of blotting-paper of the size of the print, the pasted print is transferred to the mount, and the second block, with the clear opening, is placed upon it The print with the block in position is then passed through a press. The surface retains its high glaze in the centre, and the margins are matt.

Negative Varnish.—Herr Rottmann suggests the following varnish, which, he states, is very cheap and good: 500 parts of alcohol are freed from water by shaking up with potassium carbonate every quarter of an hour for twelve hours, and then decanting from the aqueous layer of the potash. To the spirit add 60 parts of sandarac, and 20 parts of Venice turpentine; allow to stand for several days and filter, and it is ready for use. The negative has to be warmed before applying the varnish.

Photo Reliefs.—Schmidt suggests the following method for making reliefs by photography: A sheet of glass is coated with bichromated gelatine, which is prepared by allowing fifty parts of gelatine to swell for some hours in water, melting and adding two parts of potassium bichromate dissolved in forty-eight parts of water. The bichromate should be added by lamplight, the gelatine solution being constantly stirred and kept warm meanwhile. The glass should be carefully levelled and warmed, and the gelatine should be poured into the middle of the plate, using a glass rod for it to run down to avoid air bubbles, and the rod may be used to distribute the gelatine if necessary. As much solution as possible should be poured on the glass without allowing it to run over the edge, and, when set, it should be dried in a warm place free from dust, and use as soon as dry, as it will not keep long. It should be printed under the negative until an equally dense negative gives a fully printed-out image on collodio-chloride paper. It is advisable to use direct sunlight, and allow the rays to fall on it as nearly as possible at right angles to the negative, as this ensures greater sharpness. The plate should after exposure, be well washed in cold water till full relief is obtained, and then placed on one side till surface-dry, and then brushed over with a soft brush with linseed oil, and then a thin cream of plaster of Paris poured on to it and allowed to set. The relief may be readily stripped from the gelatine, and may, of course, be used as a mould for electrolytic deposition of metals.

Platinum and Gold Toning.—Kastner suggests the following treatment for matt solio paper, and states that it gives pure black tones. The prints are first toned in—

Solution of chloro-platinite of potash (1:100)	30	parts,
Potassium chloride	2	,,
Water	1000	,,

till they assume a bluish-violet colour, and they are then further toned in a bath of—

Ammonium sulphocyanide	20	parts,
Citric acid	20	,,
Chloride of gold	2	,,
Water	1000	,,

After washing, the prints are fixed.

Platinum Paper, Home-made.—In the *Mittheilungen*, Paul Hanneke recommends the preparation of this paper to attain special effect. For a support, use unsized Rives' paper, prepared with arrowroot. Take five grammes of arrowroot, and rub down in 200 c. c. of distilled water in a porcelain dish, heat and stir with a glass rod until the paste becomes a fluid, transparent mass. Brush it over the paper and hang up to dry. For the hot-bath process make the following solutions :—

1. Platino-chloride of potassium in 12 c. c. of distilled water	3 grammes.
2. Schering's solution of ferric oxalate	,,
3. Chloride of sodium in 10 c. c. of distilled water	1 gramme.

For a sheet of paper 50 × 65 c. take 4 c. c. of No. 1, 5 c. c. of No. 2, 3 c. c. of distilled water, and 6 drops of No. 3, and apply it to the paper with a wad or sable brush. The paper should be stretched upon a drawing board, and the solution brushed on in both directions. Dry in the dark at a temperature of 30 to 35° R. Paul Hanneke recommends this paper as giving softer results, but it will not keep for a great length of time.

Pyro-metol—In the following formula No. 1 is for use when it is desired to produce a strong negative; No 2 is a milder form of the same; No. 3 is the usual alkali solution.

No. 1.

Water	8 ounces.
Metol	18 grains.
Sulphite of sodium (crystallised)	360 ,,
Pyro	22 ,,
Bromide of potassium	4 ,,
Citric acid	24 ,,

No. 2.

Water	8 ounces.
Metol	18 grains.
Sulphite of sodium (crystallised)	360 ,,
Pyro	22 ,,

No. 3.

Water	8 ounces.
Carbonate of potassium	1 ounce.

For use, take one part of No. 1 (or No. 2, according to the kind of negative desired) to one part of No. 3, and add one part of water.

Quick Developers.—Professor Lainer gives an account of some experiments in this direction. In 1891 he gave some formulæ for hydroquinone and caustic soda, with addition of ferrocyanide of potash as accelerator. The special advantages were the highly efficient use of the hydroquinone and the energy of development, unsurpassed by any other method. Since then metol has been placed on the market, and is to be recommended where shadow detail is required with short exposure. But neither metol, nor any other rapid developer, should be used when the exposure is unknown. For portraiture in the studio, where the exposure may be measured with nicety, metol may be used to full advantage. The rapid hydroquinone developer is, however, in no way inferior to it. With some plates there may be a tendency to frill, in consequence of the presence of caustic alkali, but its accommodation to

exposure by dilution or the addition of bromide of potash are of value. Formula No. 3, given in 1891, was composed as follows:—

Solution A.

Water	1000 c. c.
Sulphite of soda	30 grammes.
Ferrocyanide of potash	90 ,,
Hydroquinone	10 ,,

Solution B.

Water	600 c. c.
Caustic soda	200 grammes.

For use, take 60 c. c. of A, 8 c. c. of B, and add 3 c. c. of a one per cent. solution of bromide of potash.

Development is complete in one to two minutes, or, if diluted with an equal quantity of water, three minutes will suffice. The developer is easily adjusted to different kinds of plates. With less caustic soda the negative is more brilliant and development slower. With more caustic soda the contrasts are less, and this may be increased until, with double the quantity, an absolutely flat negative is obtained. Sufficient solution must be used to avoid yellow stain, and for the same reason development must not be prolonged. To check further action, place the negative in a one per cent. solution of hydrochloric acid. Fix in a ten per cent. acid sulphite fixing bath. Yellow negatives may be cleared with ferridcyanide of potash, one gramme to 900 c. c. of water. Rewash and fix in a ten per cent. bath.

Reproductions of Drawings without a Camera.—According to Dr. Phipson, the following process is used in America for this work. A well-polished glass plate is coated in the dark with a mixture of—

Whites of eggs	2
Ammonium bichromate	46 grains.
Water	2½ ounces.
Ammonia	*q. s.*

The solution should just smell faintly of ammonia, and be filtered. The plate is first coated with this, and allowed to drain, and then coated again; and it is now dried by being moved quickly to and fro over a spirit flame. No coating can be seen on the plate when it is dry. It is exposed in diffused light under a drawing, engraving, &c., from one-half to one and a half hours, according to the thickness of the papers. After exposure, it should be taken into the dark room, and coated with a solution of—

White wax	1 part,
Venice turpentine	4 parts,
Benzine	36 ,,

to which sufficient asphalt is added to give it a dark brown colour. The solution should be filtered several times through muslin. After coating, the plate should be allowed to drain. The plate dries very quickly, but still remains sticky, and should be dusted over with powdered graphite. It should then be placed in the dark, in a dish of cold water, and left from thirty to ninety minutes, and then gently rubbed with a soft pad. All parts not affected by light will be washed away, and a very good negative be thus obtained. If a zinc plate be used, an image is obtained which will stand etching with ferric chloride 50 parts absolutely, alcohol 100 parts.

Reproduction of Plans, Drawings, &c.—The following process is described by A. Carteron: A well-sized paper is selected and cut rather larger than the drawing to be copied. An ink is prepared by dissolving 8 to 10

grammes of gum arabic in 100 parts of water, and adding thereto a few drops of aniline blue or other suitable dye. The drawing is traced upon the paper with this ink and allowed to dry. The entire surface of the paper is then covered with printers' ink, by means of a roller or stiff brush, and well equalised. After a short interval the entire sheet of paper is immersed in water, and, by means of a roller or brush, passed delicately over the surface, the ink is disengaged from the traced lines. This is facilitated by the solution of the gum. The lines are thus represented by bare white paper, and the tracing may be used as a negative. If a very opaque ground is wanted, the background of printers' ink may be intensified by brushing on bronze powder with a badger's-hair brush.

Reversed Negatives.—Professor Lainer, gives the following particulars of a method for stripping gelatine plates. Having made some experiments with an addition of formalin to the above-mentioned hydroquinone developer (p. 903), noticed that the films were easily lifted, the use of formalin and caustic soda and for stripping seemed probably useful. The following solutions were prepared :—

A. Water	200 c. c.
Solution of caustic soda (1 : 3)	10 to 15 c. c.
Formalin	4 c. c.
B. Water	300 c. c.
Hydrochloric acid	10 to 15 c. c.

Some old, unvarnished negatives were soaked in A for about five minutes, and, after rinsing, transferred to B. After soaking five or ten minutes, the film is loosened at either of the narrow sides of the plate with the fingers, carefully avoiding the least tear. If this should happen, begin again at the opposite end of the plate. When the film is loosened and turned over for the breadth of a centimetre, it may be stripped without further trouble. The film is turned over in the bath and adjusted to the plate, held by the upper corners and withdrawn from the bath. The plate is then stood up to dry, and after a short time blotted with filter paper to remove any drops of water that might cause blisters. Further practice will show if it is necessary to use plates coated with gelatine for the transfer, or if it is sufficient to secure the edges of the plates and films with a solution of gelatine. As there is very little enlargement of the film, sometimes scarcely any, the process might be used by photographers to make companion pictures in opposite position.

Sensitiveness of the Retina to Light.—Every one knows how, when a negative during development is raised to the gaslight to judge of its density, the eye will often become apparently fatigued or strained, and unable to judge of its characteristics. In a paper presented to the Royal Society, Captain Abney gives the result of his examination of this effect, and has formulated a rule showing its direction and extent. He finds that, 'the smaller the spot of illuminated surface, the less reduction of the intensity of the light is required, and that the amount of reduction of the light falling on the spot, which just produces no sensation of light, is expressed by a simple formula, $I = x^m$, I being the intensity, and x the diameter of the spot." From this will be seen the usefulness of that plan of negative judging, in which the negative is placed behind an opaque screen perforated with a small aperture, instead of being held up before the light and examined as a whole, rather than piece-meal, as it were.

Silvering Glass.—The following method of silvering glass was given in *Cosmos* :—

Silver nitrate	30 parts.
Ammonia	15 ,,
Distilled water	60 ,,
Oil of cassia	2 ,,
Alcohol	90 ,,

Dissolve the silver in the distilled water and add the ammonia allow to stand for twenty-four hours, and then add the cassia dissolved in the alcohol. Place the glass to be silvered in a horizontal position, and give it an edging of mastic, and flow the above solution over it till it is four or five mm. thick. In an hour a good thick film of silver will be formed, which can be washed in alcohol, dried in an oven, and varnish.

Solubility of Silver Chloride in Ammonia.—In a theoretical paper bearing upon the conditions obtaining during the admixture, under varying states of pressure, of ammonia and silver chloride, Mr. R. Jarry, in *Comptes Rendus*, gives a table of the solubility of silver chloride as follows :—

NH_3	...	·145	...	·294	...	·560	...	·624	...	1.177	...	1·636
AgCl	...	·049	...	·136	...	·344	...	·400	...	·468	...	·518
NH_3	...	2·816	...	2·98	...	3·019	...	3·243	...	3·456	...	3·748
AgCl	...	·659	...	·709	...	·725	...	·587	...	·477	...	·39

The remarkable fact is here shown that, up to a certain concentration, increase of strength in the ammonia solution brings about an increase in the amount of chloride dissolved, but that, when a certain point is reached, any further strengthening of the ammonia leads to a decrease in the silver chloride dissolved.

Stripping Films.—In Eder's *Jahrbuch*, Obernetter suggests the following method of stripping negatives with the aid of formalin. A mixture of 50 parts of formalin and 300 parts of water is made, and in this old negatives are bathed for from six to ten minutes, whilst freshly developed negatives only require from three to five minutes, after which time they should be well rinsed, and then either dried, or else, whilst still damp, coated with a solution of 200 parts of hard gelatine, which should be allowed to swell for twenty minutes in cold water, well pressed, and dissolved by heat in 1000 parts of water. When dissolved, 100 parts of alcohol, 20 parts of glycerine, and 20 parts of glacial acetic acid should be added. The negative should be coated to a depth of about one-twelfth to one-eighth of an inch with this solution on a levelled stand, and allowed to thoroughly dry, and then the edges cut round, and placed in a mixture of 50 parts of glycerine, 500 parts of alcohol, and 1200 parts of water, when it will soon begin to frill, and it may be stripped and transferred to another sheet of glass, or else used as a film negative.

Stripping Prints.—Frequently, when enamelling gelatino-chloride prints by squeegeeing them on to glass, it is found that they will stick and refuse to strip. If the glass is placed flat on the table, and the back of the print rubbed over with formaline till quite saturated, and then allow to dry, the print will readily strip.

Thiosinamine Toning.—According to Liardin the following mixture may be used for a combined toning and fixing bath with good results for gelatino-chloride paper :—

Water	100 parts.
Thiosinamine	100 ,,
Solution of chloride of gold (one per cent.)	100 ,,

The prints must remain in this bath about eight minutes. If the following chlorides are used, the various tones are obtained. Potassium chloride gives brown, salt yellowish brown; cadmium chloride gives first orange, then grey green; aluminium chloride gives greyish brown, yellowish brown, and greenish grey tones; nickel chloride gives yellowish sepia; cupric chloride in fresh solution, yellowish green; when old, grey green; platinum chloride, grey brown; potassium chloro-platinite, brown; gold and potassium chloro-platinite gives blackish violet; and aluminium and platinic chloride brownish sepia.

Three colour Projection.—According to M. Marguery the positives made in the usual way with bichromated gelatine can be coloured with the following solutions. For the red sensation :—

Carmine	5 parts.
Ammonia	15 ,,
Water	100 ,,

For the green sensation, a saturated solution of picric acid; for the blue-violet sensation, a ten per cent. solution of methyl violet.

Toning of Bromide Prints.—According to Valenta the following procedure will give any desired colour on bromide paper, developed with any of the alkaline developers. Ferrous oxalate must not be used. The print should be soaked in water in a flat dish till soft, then drain off the water and apply the following solutions as directed.

Solution A.

Uranium nitrate	5 grains.
Water	1 ounce.

Solution B.

Potassium ferridcyanide	4 grains.
Water	1 ounce.

Solution C.

Ferric chloride	4 grains.
Water	1 ounce.

For sepia brown tones, mix 9 parts of *A* with 1 part of *B*, and the toning should be allowed to continue for from six to ten minutes. The tones range through black to sepia, bistre, dark sepia, and Vandyke brown. For brownish red tones mix *A* and *B* in equal parts and tone for six to eight minutes. For orange red tones, mix 35 parts *A* and 75 parts *B*.

For bluish green mix *A* and *B* in equal parts, and tone till one image is a dark sepia brown, and then wash well, and then treat with a mixture of the part of *C* with 5 parts of water. Toning will take from two to four minutes, and the print should then be washed and dried.

For blue tones the print should be treated with equal quantities of *A* and *B* till a brownish red colour is obtained, and then washed and treated with *C*, when in about three minutes the desired tone will be reached.

Toning Gelatine Prints.—Mr. Otto Pfenninger recommends the following method: Wash the prints in one or two changes of water, then tone ten minutes in solution :—

Formalin	1 drachm.
Water	8 ounces

Wash again in one or two changes of water.

The formalin does not interfere in the least with the toning. Tone in the following bath :—

B.	2 ounces.
U.	½ ounce.
St.	½ ,,
G.	1 ,,

This solution is to be made up one quarter of an hour before using it in the named rotation, shaking well after each addition.

St. can be omitted in the winter time, or if the paper is fresh, as it does not interfere with the tone.

Make the bath up for the whole amount of sheets to be toned.

The prints will turn in this bath orange-red, and even appear stronger, then return to the original strength, and, if the high lights look clean, and the colour is about like a finished albumen print, the toning is finished. Time required, about two or three minutes ; even quicker if your paper is in good condition. Don't attempt to tone bluish, or your print will be over-toned, and appear dirty yellowish. Move the prints well in the toning bath, and rinse well after, or stained prints will result. Judge the tone from the surface, and not by transparency, as the uranium gives you ample range of colour. If that change to red does not take place with your paper, don't use your bath or change your paper. One grain of gold to the sheet is required, not more.

Stock Solutions.

B.

Borax	4 ounces
Water (ordinary)	80 ,,

Dissolve hot, but use cold.

U.

Nitrate of uranium (in sealed tube)	1 ounce.
Water (distilled)	35 ounces.
Nitric acid	½ ounce.

Keep in the dark, and don't expose to the light.

St.

Nitrate of strontium	1 ounce.
Water (ordinary)	30 ounces.

G.

Chloride of gold	15 grains.
Water	15 ounces.

Varnish for Collotypes.—Ad. Berold recommends the following:—

Powdered bleached shellac	25 grammes.
Alcohol	85 ,,
Ammonia	65 ,,
Boiling water	125 ,,
Glycerine	6 ,,
Dextrine	¼ gramme.

The shellac is first dissolved in the alcohol, the ammonia is then added, and the solution well shaken at intervals. The water, to which the glycerine and dextrine are added, is boiled and gradually mixed with the solution of shellac previously poured into a basin or other suitable vessel. Well stir, and set out to cool. When cold, filter several times. The addition of a trace of borax

prevents any particles of shellac being thrown down. If large quantities are prepared, the dextrine may be reduced to one-thirtieth per cent. of the total quantity. The varnish keeps well, and, should it become too thick, may be thinned by adding hot water with a little alcohol and glycerine. To varnish collotypes so that they may have the same finish as albumenised prints, float them on the varnish in the same way as for sensitising paper.

Velox: an Ideal Printing Paper.—This is the title used by Mr. Maxmilian Toch, in referring to Velox, an American bromide paper. Says Mr. Toch, in *The Photographic Times*, 'Velox Carbon is called the paper of the future, and, as I have used every paper ever put on the market, I abandoned them all, even the use of platinum, for it. I expose Velox carbon to an ordinary 16-candle power gas flame for thirty seconds, about ten inches away from the flame, and keep the printing frame moving all the time so as to get a uniform impression. I then take the paper face up and put it in a wet tray, and paint the film side with a mixture of—

Amidol	60 grains.
Sodium sulphite	1 ounce.
Water	16 ounces.
Potassium bromide	1 grain.

All this I do by the same light about ten feet away from the gas, and sometimes I have a candle burning a foot away from the tray. The picture comes up instantly, and after noting that it is uniform—for, if it be not entirely uniform, I keep brushing the developer on the uneven parts—I plunge it face down in the acid hypo bath, and keep it moving for a few seconds, and the operation, with the exception of subsequent washing and mounting, is done. The developer I use gives intense blue-black prints, in every respect equal to platinum. Two things are necessary for absolute success with Velox carbon: first, the use of distilled water; second, cleanliness. It is necessary to become ambidextrous in order to have good results. I use the right hand for handling the paper, and for brushing on the developer, and I use my left hand for moving the print in the hypo. I drop the print with the right hand into the hypo, and then use the left hand for plunging and continued motion, after which I wash the left hand in a small dish of acidified water, and go on with the next. The whole process becomes mechanical in a short time, and the resulting prints are all that can be wished for. Sometimes I make over three dozen an evening, and, although the makers do not advocate extensive washing, I find that, where the acid hypo bath contains plenty of alum and is fresh, the prints do not suffer from being in the water all night. The glossy Velox is admirable for those who like glossy prints. I have used it to some extent, but I prefer the Velox carbon.'

Vignetting Glasses.—Rev. Arthur East says: Many amateur photographers may be glad of a simple way of making their own vignette glasses, and at practically no cost. We take a piece of brown paper and cut it to the shape and size of the vignettes required, and paste it on to an old and cleaned (or a piece of ground glass by preference) negative glass. This is put into a printing frame, the paper being *outside*, *i.e.*, farthest away from the back; then upon this is laid a sensitised plate, *reversed*, *i.e.*, the film next to the back of the printing frame; put on the back, and adjust the fixings, and expose to daylight or artificial light exactly as in making a lantern transparency by contact, only that during exposure the printing frame should be held in the hand and twisted in all directions to get a soft shading; then develop right through the film until it will develop no more, and you will have a perfect vignetting glass, so soft in shading that you may print with it in full

sunshine. Any old and doubtful plates may be used for this purpose; the exposure naturally must be suited to the kind of plate used, and in use the film side of the vignette glass should be farthest from the negative if a soft outline is required.

Warm tones on Lantern Slides and Transparencies.—Mr. Milton B. Punnett remarks: The following two methods of changing the tone of lantern slides and transparencies I have never seen published, and, as they are simple and in season, I hope that they will prove acceptable. In my experiments I used Seed's lantern-slide plates, developed with their metol-hydroquinone developer, and fixed in a chrome alum hypo bath. After fixing, plates were washed and *dried*.

DARK PURPLE TO BROWN.

Hypo	4 ounces.
Water	32 ,,

Heat nearly to boiling, and add powdered common alum, one ounce. Shou'd be used cold. If used hot, it will deposit sulphur in the film. Bath works better if it is heated moderately hot several times, and allowed to cool. It should not be filtered, and improves with age. Place the dried slide in the bath until it is toned, which may take a number of hours. The longer it is in the bath, the browner it becomes The tone is also dependent on the strength of the image. After toning, wash well and dry. The colour seems to be permanent; at least it has withstood the action of the sun for several days.

DARK BROWN TO BRICK RED.

Potassium bichromate	10 grains.
Common alum	150 ,,
Table salt	20 ,,
Water	4 ounces.
Nitric acid, c.p.	10 minims.
Sulphuric acid, c.p.	20 ,,

Bleach the image thoroughly in the above solution. This will take but a few minutes. Rinse well and tone in a strong solution of hydrogen sulphide.

Washing after Fixing.—Herr Gaedicke gives particulars of a series of interesting experiments. The plates were rinsed after fixing, and then washed by means of several changes of water at intervals of five minutes, the dish being rocked occasionally. The plates were 12×16, and 100 c. c. of water were used at each change. The amount of hyposulphite of soda taken up by each change of water was ascertained volumetrically, with a solution of 5·12 grammes of iodine and 15 grammes of iodide of potassium dissolved in 1 litre of water 1 c. c. of this solution will decompose 1 milligramme of hyposulphite of soda. The following are the results of two series of experiments, one made in the laboratory and the other at a meeting of the Deutsche Gesellschaft von Freunden der Photographie, Berlin:—

	Iodine Solution used.	Hyposulphite of Soda. Laboratory Experiments.	Public Demonstrations.
1st wash water	16 5 c. c.	0·165 grammes	0·336 grammes.
2nd ,,	2·5 ,,	0·025 ,,	0·050 ,,
3rd ,,	10·5 ,,	0·005 ,,	0·008 ,,
4th ,,	0·1 ,,	0·001 ,,	0·001 ,,
5th ,,	0·05 ,,	0·000 ,,	0·0005 ,,
6th ,,	0·00 ,,	0·000 ,,	0·000 ,,

The plate was washed film upwards; but, if inverted or upright, elimination would, of course, be more rapid. It may therefore be assumed that a plate with a thin film is thoroughly washed by five to six changes of water at intervals of not more than five minutes. A plate thus washed was intensified with bichloride of mercury. The deposit was blue-black, with clear shadows, and without any trace of brown indicating the presence of hyposulphite of soda.

Yellow Screens.—Fleck stated, in *Le Moniteur de la Photographie*, that the best yellow screen for erythrosine-sensitised plates is made by dissolving—

Acridine yellow	10 parts.
Alcohol	150 ,,

and—

Fuchsine	5 parts.
Alcohol	100 ,,

To a two per cent. raw collodion should be added twenty parts of the acridine yellow and seven to eight parts of the fuchsine solution.

RECENT NOVELTIES IN APPARATUS, &c.

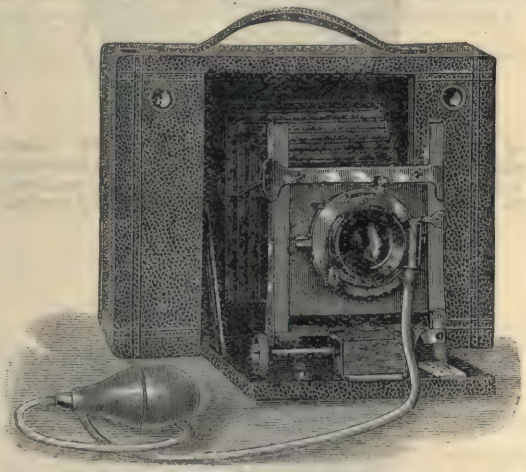
By The Editor.

THE NO. 4 CARTRIDGE KODAK.

The Eastman Photographic Materials Co., 115, Oxford-street, W.

This, one of the latest forms of the Kodak series, has been designed as a moderate-priced, high-class folding camera, suitable for various classes of work. When folded, it is only $3\frac{1}{8}$ inches in thickness, and, being easy to carry, is adapted for attachment to cycles. It takes rectangular 5×4 pictures; has a capacity of 12 exposures without reloading; the size of camera is $3\frac{1}{8} \times 6\frac{3}{8} \times 8\frac{1}{4} = 167$ cubic inches; the weight, when loaded, 2 lbs. 12 ozs.; and the length of focus of the lens, $6\frac{1}{4}$ inches.

The No. 4 Cartridge Kodak takes either daylight loading film cartridges or glass plates, is fitted with a rapid rectilinear lens and pneumatic release shutter



with iris diaphragm stops. This shutter has three speeds for instantaneous exposures; it makes short-time exposures by one pressure of the bulb, the shutter closing when the bulb is released, and makes longer time exposures by pressing the bulb once to open the shutter and again to close it. It may be operated by the finger trigger instead of the bulb when so desired.

The camera is also provided with a rising, sliding, and falling front, two view-finders, one for vertical and one for horizontal exposures, two sockets for tripod screws, and may be used either as a hand or tripod camera. It has an index for focussing, and when used with plates may be focussed on the ground glass if desired. The plate adapter can be put in place or removed in five seconds, and, when used with film, there are no projecting parts.

THE 'LUZO' ROLLABLE-FILM HAND CAMERA.

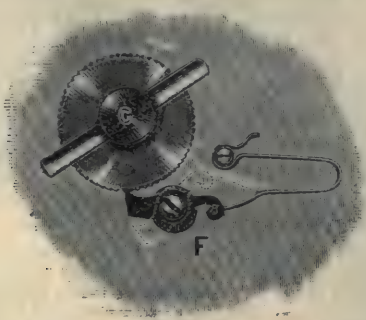
Redding & Gyles, 3, Argyle-place, Regent-street, W.

THE actual dimensions of the 'Luzo' hand camera are $5 \times 6\frac{3}{4} \times 4\frac{1}{4}$. The body is made of Spanish mahogany, and as a specimen of photographic cabinet work is one of the most excellently constructed and finished that we have seen. It is fitted with a rectilinear lens of very good defining power, and the



finder, of biconcave form, gives an image of remarkable brilliancy. The shutter admits of a variation of the exposure from time to instantaneous.

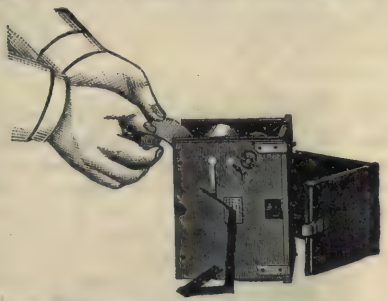
Fig. 1 shows the camera on its case, in which it may be placed for actual use, as the case is holed opposite the exposing and changing mechanism. The



Luzo takes rollable celluloid film, and, after an exposure has been made, it is necessary to wind off the exposed film by turning the handle C (fig. 2), on the top of the camera, slowly to the right, at the same time watching the spring indicator, which will gradually rise and return with a click; the instant the click is heard, stop winding and press the button at the back of the camera,

which marks the spaces between the exposures. By this means each exposed film is accurately measured off.

Fig. 3 shows how a portion of the exposed film may be rolled off in the dark room, and fig. 4 indicates the method of attaching the end of the film to



a metal cylinder in the camera, preparatory to winding up ready for exposure. The Luzo takes a spool of film for forty-eight exposures, the number of which is registered as they are made.

The Luzo is extremely simple in use. It demands only three operations for instantaneous work, which are thus summarised :—



1st.—Set the shutter.

2nd.—Hold the camera steady ; see that the object appears in the finder, and press the trigger.

3rd.—Wind off the exposed film, and press the button which is at the back of the camera.

It is a well-thought-out, beautifully made, and practicable little instrument, which deserves to be popular.

BAKER'S POCKET CHANGING BAG AND FOCUSSING CLOTH.

W. R. Baker, Wallington, Surrey.

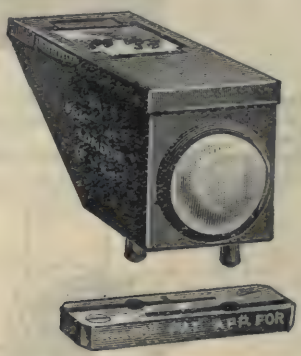
THIS pocket changing bag is made of several thicknesses of black and red material which are light-proof, and is furnishe i with an opening for the eyes, to which is attached a band of soft leather, which adapts itself to the face, and is retained in position by two elastic straps that fasten at the back of the head by means of a hook and eye. In front is a window of three thicknesses of red material that admits a perfectly safe light, the amount of which can be

regulated by fastening one or more of the hooks that keep up the blind, or by turning it to or from the light when in use. As no glass or other breakable material is used, the bag cannot be injured by being packed up in the camera case or pocket, and, the mouth and nose being outside the bag, the breathing is not interfered with. In the small size the plates are put in through one of the sleeves, which is afterwards closed by an elastic band. The larger sizes are made to open at the bottom, and close by means of a flap that fastens between the folds of material that form the sides.

THE 'KALOS' BRILLIANT VIEW-FINDER.

Price, Hill, & Co., 4, Berry-street, Clerkenwell-road, E.C.

THIS finder is constructed on the triple lens system, and, being optically adjusted, produces an exact reproduction, in miniature, of the view appearing



on the plate. It is fitted with a revolving wheel, which shows horizontal or vertical views at will. The finder answers admirably in practice and gives an image of a high degree of luminosity.

STAND CAMERAS WITHOUT FOCUSSING SCREENS.

Thompson & Co., 4, Bull's Head-yard, Manchester.

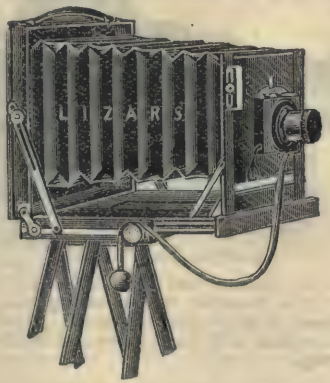
MR. MCKELLEN has drawn our attention to his system of providing stand cameras with a focussing scale and by the use of the Heywood finder, that is to say, an eyehole in conjunction with a rectangular frame the size of the plate used, dispensing with a focussing screen. The camera is set up in the ordinary way on its legs, and the lens placed in position. The correct focus is found for the nearest distances by the ordinary rack-and-pinion work. A line or pointer is marked on the travelling rail, and a corresponding line on the baseboard exactly opposite the pointer line. Several objects at various distances are focussed and lines marked on the baseboard opposite the pointer line as before. As many of these scales are marked as there are lenses in use with the camera. If now the camera is set up at any future time and the pointer line racked to any of the marks and the proper lens inserted, the camera will be correctly focussed for the distance indicated by the pointer. If a square bellows camera is being used, the frame of the Heywood finder may be attached to the front, and in this case it would be the full size of the plate. The sight piece will be

fixed on the top of the camera body. The camera is now racked out to the requisite distance, and the eye being placed to the sight-hole the composition of the picture can be seen through the frame in a much truer and more convenient manner than when a focussing cloth and ground glass are used. If a taper bellows camera is being used, a pocket folding finder will be convenient, and may be attached to the top of the camera body and placed in position when required. It consists of a miniature camera baseboard with a sliding middle, and to the back end of the latter the sight piece is hinged, so that it will fold down when not in use. To the front end of the former a wire frame is swivelled in such a way that, when erected and the eye placed to the eyepiece, the composition of the picture may be viewed. A scale is marked on the slide the figures of which represent the foci of various lenses from 4″ to 8″ for quarter-plate, and so on according to size of plate to be used. Cameras so constructed are to be placed on the market by Messrs. Thompson & Co.

THE 'NEW CHALLENGE' STAND CAMERA.

J. Lizars, 101, Buchanan-street, Glasgow.

The camera is made of thoroughly seasoned Spanish mahogany. The back of the camera moves forward, on brass guides, to allow of the use of wide-angle lenses. It is also provided with swing back, reversing back, rising front, and long double extension bellows, the bellows being leather of the best quality. The double dark slide is made of the same material as the camera, is of book



form, with triple hinged shutter and automatic closing springs, and goes into the camera with one inch of slide. The lens is rapid rectilinear, working at *f*-8, and fitted with iris diaphragm. The shutter is of the Thornton-Pickard manufacture, with speed tablet and pneumatic release, which can be used for instantaneous photography from $\frac{1}{15}$th to $\frac{1}{50}$th part of a second. The shutter forms part of the front of the camera, but can be detached when desired.

THE 'MCKELLEN' STAND CAMERA.

Thompson & Co., 4, Bull's Head-yard, Manchester.

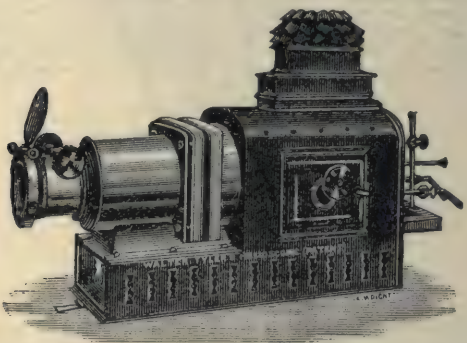
Mr. McKellen has shown us one of the latest patterns of his well-known stand camera, 12 × 10. It is an exquisitely finished instrument, and is constructed on almost identical lines to the camera which secured the Photo-

graphic Society's medal in 1884. Every required movement is embodied in the camera, one of the features of which is the great range permissible in raising or depressing the lens. The front may be so moved that the lens is easily placed opposite either the extreme top or bottom of the plate, should such an amount of displacement be required. This is accomplished by an arrangement of struts fitting on the front, that enables the fork to be telescoped up, and with it the front. These are all in three rising movements: one of the lens front, a two-inch side rise, and the telescopic arrangement referred to. The back part of the camera is a fixture, that is to say, it does not focus in, and with the use of short-focus lenses the baseboard does not cut off. The McKellen stand camera is the perfection of what such an instrument should be.

TYLER'S NEW HELIOSCOPIC LANTERN.

Walter Tyler, 48–50, Waterloo-road, London, S.E.

THIS lantern is suitable for use with either oil or limelight. It can be used for exhibiting in the smallest drawing-room or largest lecture-hall. The body has been generally remodelled, special attention being paid to the ventilation.



For the ordinary 4-in. condenser has been substituted a plano-convex compound condenser of 4½ in. diameter, thus increasing the amount of light. The special feature, however, is in the front objective. This lens is composed of a special portrait combination of 2⅝ in. diameter and fitted with patent shutter and grooves for tinting.

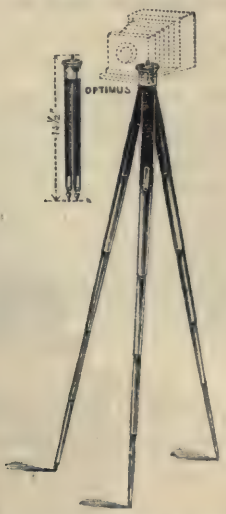
FITCH'S CELLULOID FILMS.

E. H. Fitch & Co., Seldon House, Fulwood's Rents, E.C.

THE ever-increasing demand for Fitch's films is the best testimony to the excellence of the goods supplied by Messrs. Fitch & Co. There can be no doubt that the success which they have attained is in no small measure due to the long experience this firm have had in the manufacture of films, and there is no gainsaying the fact that, at the present day, there is no more popular film on the market. We hear that the cinematograph film now made by Messrs. Fitch & Co., is bidding fair to rival in reliability and popularity their ordinary cut films and we can unhesitatingly say that this is no more than it deserves, as it is a perfectly coated film, and as to the quality of the emulsion, we need only say that some of the finest photographs of the Jubilee procession were taken on the film.

OPTIMUS TELESCOPIC TRIPOD.

Perken, Son, & Rayment, 99, Hatton-garden, London.



Closed 14½ inches long; open, 49 inches high.

Being made of aluminium, this camera stand is admirably adapted for cyclists, tourists, and others who desire a light and rigid tripod.

Although occupying exceedingly little space when closed, it extends to a full practical height when opened for use.

THE 'VRIL' CONTACT BREAKER FOR INDUCTION COILS.

W. Watson & Sons, 313, High Holborn, London, W.C.

The 'Vril' Contact Breaker is the invention of Mr. James King, A.I.E.E., and it can be supplied to almost every make of existing induction coil. The construction is such that it gives a prolonged period of contact, affording the necessary time for the thorough magnetic saturation of the core, combined with a very sudden break. The results obtained with the ordinary vibrating break are yielded by the 'Vril' with fifty per cent. less battery power. With twenty-five per cent. less battery power than is requisite to run the ordinary vibrating break, fifteen per cent. more spark length is yielded by the coil if the 'Vril' contact breaker be employed.

The heating of the platinum contacts is greatly diminished, and does not become very appreciable with a long run of thirty minutes or more; liability to adhere is obviated, and the wear of platinum very much reduced. The speed of the make and break is controlled by means of an adjusting screw. A vacuum tube will often be found not to work at a certain rate of make and break, but if the frequency be altered it will at once run perfectly. The

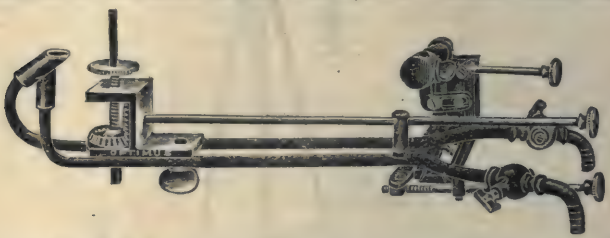
'Vril' affords facilities for varying the speed of the vibration exactly. It produces the same effect as a mercury interrupter, without any of the disagreeable trouble and annoyance that is caused by the latter.

When once set in motion, it requires no attention.

OPTIMUS ADJUSTABLE LIMELIGHT JET FOR PROJECTION LANTERN.

Perken, Son, & Rayment, 99, Hatton-garden, London.

AN inexpensive, yet reliable, limelight jet capable of horizontal and vertical adjustments for centering the illuminated spot on the lime exactly in the optical axis of the lantern has long been required. Messrs. Perken, Son, &

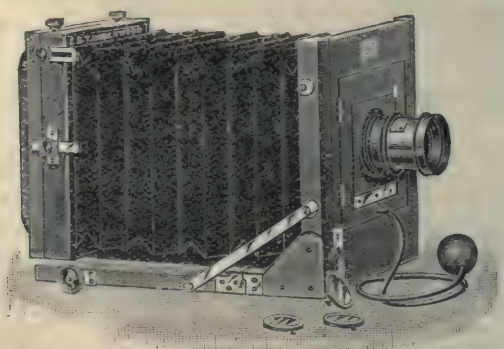


Rayment have introduced a jet with such an arrangement actuated by rods projecting beyond and at the back of the lantern. The mechanical movements are simple and strong, and therefore are not liable to become deranged.

THE 'ROYAL.'

E. & T. Underwood, 130, Granville-street, Birmingham.

A NEW camera of fine Spanish mahogany, and excellent workmanship and finish. A special feature in it is the shutter. This is a time and instantaneous



one of the roller-blind type, and works inside the camera. The camera front is formed as a panel and the shutter is attached to the inner face thereof, the setting and release arrangements working from the exterior. A smaller panel is removable, and permits the use of various lenses.

THE OPTIMUS DARK-ROOM LAMP.

Perken, Son, & Rayment, Hatton-garden.

THE principles upon which this lamp are constructed are such as to render it of great practical service for dark-room work, and, having had it in actual use, we can testify to its utility. It is made for gas, and has a ventilating shaft, not shown in the cut. The interior is japanned white, by which means loss of

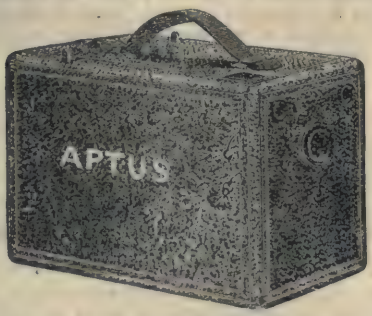


light is largely obviated. It will be observed that movable windows, of ground, ruby, and orange glass, are fitted to the lamp, an arrangement which allows of the colour of the light being varied at will, a great convenience to those whose photographic operations include the manipulation of bromide paper, orthochromatic and very sensitive plates, &c.

THE 'APTUS' MAGAZINE HAND CAMERA.

Sharp & Hitchmough, Dale-street, Liverpool.

WE have been shown several photographs taken in the Aptus Magazine Hand Camera, with the lens at the full aperture, *f*-11, and the excellence of definition



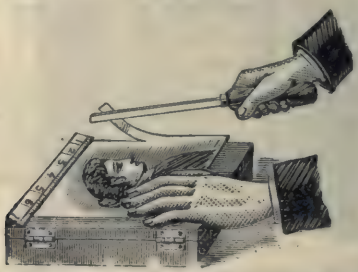
is so conspicuous that the camera could not have a better testimonial to its efficiency. It is, moreover, extremely simple to work, the sheaths being easily and certainly changed by a simple side-to-side movement on the top of the camera. The lens, as we have hinted, is of very good quality. The camera

is fitted with an automatic indicator; two finders, for vertical and horizontal pictures; iris diaphragms, working in front of the lens and controlled from outside the camera; time and instantaneous shutter; while the twelve sheaths take either as many plates, or twenty-four films.

THE 'PRIMUS' PRINT-TRIMMER.

W. Butcher & Son, Blackheath, S.E.

THE 'Primus' lightning print-trimmer consists of a polished mahogany board, with a sharp steel edge on one side, and a box-wood rule running at right

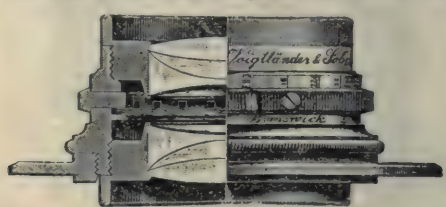


angles to it along the top. The trimming is done by means of a stroke with the cutting blade against the steel edge of the board. The trimmer is made in box pattern, as shown in the illustration, and thus is useful for keeping unmounted prints, &c., until required for use.

VOIGTLANDER'S LENSES, SERIES II. AND IV.

Manufactured by Voigtländer & Son, Brunswick, and 92, Hatton-garden, E.C.

SERIES II.—This series is designed for hand-camera and instantaneous work. The aperture has accordingly been opened out to the fullest available extent, viz., *f*·5·6. We were surprised to find that a No. 2 of the series, of 4¾ inches equivalent focus very well covered a half-plate, although, of course, the acme of definition was not obtained at the margins; by diaphragming down to *f*·8, however, the half-plate is well and easily covered. On the quarter-plate, at



full aperture, the definition is exceedingly fine and crisp, the illumination even, the field flat, and the errors of spherical aberration and astigmatism not apparent. This lens should prove an excellent instrument where short exposures are essential for it appears to have been corrected so as to reduce the aberrations to the minimum.

Series IV.—This lens is intended exclusively for work of a wide-angle

character, where, of course, rapidity of exposure is not a desideratum. Its full aperture is *f*-11·3, and a No. 5 of 10¼ inches equivalent focus covers a 11 × 9 plate, thus embracing an angle of 75°. At *f*-32 a 12 × 10 plate is covered. The field of the lens is remarkably flat, and, as befits an objective of this character, its defining power is unexceptional. We could detect no astigmatism of the image. There is no doubt of the Series IV. proving an invaluable instrument for reproductions, copying architecture, and allied purposes. The Voigtlander lenses are noted for beauty of finish and purity of glass, and are well calculated to hold their own in the field of photographic optics.

KODAK BICYCLE CASES AND ATTACHMENTS.

The Eastman Photographic Materials Company, 115, Oxford-street, W.

THE lightness and unbreakable character of film make the Eastman Kodaks particularly suitable for carrying on the cycle, and, in addition, the Company have devised special means for safely securing their cameras to the machine.

The carrying case for the No. 4 Cartridge Kodak is of very simple and efficient design. It is strongly made of wood, covered with fine-grained leather and lined with cloth, and is fitted with springs on the inside, which take up the vibration of the wheel and prevent injury to the camera. By means of two single thumb screws, which securely grasp the tubing, the case may be attached to the head of the machine, or suspended from the top bar, inside the frame. Although carrying a camera giving so large a picture as one five inches

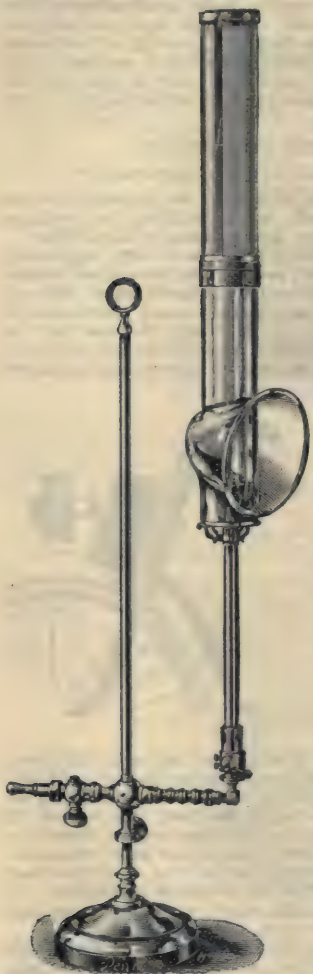


by four inches, the case is only three and three-quarter inches in thickness, and in no wise inconveniences the rider when hung from the top horizontal bar, nor does it run much chance of injury in case of a fall. The clamps can be attached to any side of the case (except, of course, the door), and, in using it on the bicycle head, the door may be at the top, at either side, or directly in front, in which latter position the case presents almost no 'wind resistance.' There being no play at the points of contact with the machine, it will not wear the enamel. The outside measurements of the case are 3¾ × 5¼ × 8¾ inches.

The door fastens with a strong brass catch, which is very ingenious, and can be opened with one hand, yet cannot jar open, and will not rattle.

By means of a set of adjustable washers, the case may be held far enough in front of the bicycle head to allow for the free passage of a brake rod. It may also be provided with a lamp-bracket attachment. A set of washers are furnished with each case, and by their use the clamps will firmly grasp any

tubing from seven-eighths of an inch to one and a quarter inches, both inclusive. No wrench, screwdriver, or other tools are necessary in making the attachment.



PENROSE'S IMPROVED INCANDESCENT GAS LIGHT.

Penrose & Co., 8, Upper Baker-street, W.C.

THIS modification of the incandescent gas light has for its object the securing of a more actinic light from the ordinary Welsbach burner and mantle, thus rendering the form of lighting suitable for small workers who do not require such an expensive installation as the electric light.

The improvements consist essentially in conveying a larger volume of air to the burner, in more perfectly mixing the gas and air, in securing full combustion by using a longer chimney, and in concentrating the light by means of a parabolic reflector.

Messrs. Penrose use the Welsbach C burner, with the usual mantle and chimney, so that those who already have burners of this pattern can have the improvements fitted thereto.

The burner can be attached to existing gas brackets, pedestals, or a table stand is supplied, as shown in the illustration.

The improved light has been thoroughly tested against the ordinary burner, and has shown a very marked advantage. It is recommended for copying on dry plates, enlarging, printing bromide and other development papers, lantern-slide and transparency-making, and all kinds of contact printing requiring a brilliant and constant light.

THE STIGMATIC LENS (f-6).

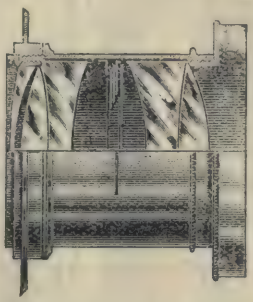
J. H. Dallmeyer, Limited, 25, Newman-street.

HAVING been given the opportunity of subjecting one of the above lenses to actual trial on the camera, we are enabled to pen the following notes on its practical performances.

Optical science, in the construction of modern photographic lenses, has a threefold problem to solve. This is, to provide objectives of large angular aperture, from which the errors of spherical aberration, curvature of field, and astigmatism have been eliminated. The first-named defect, which, practically considered, amounts to a general degradation of the image over the whole plane of definition, is one to which lenses of large angular

aperture are conspicuously prone, and to destroy its effects, while at the same time reconciling the property of flatness of field with the power of the lens to transmit oblique pencils of light as perfectly as those which pass through its centre, is obviously a task which, if accomplished, renders the lens that has been thus corrected of singular value and efficiency.

The Stigmatic possesses the optical virtues named in a pre-eminent degree. A lens of six-and-a-half-inches focus perfectly covers, at full aperture, a plate whose base line equals eight inches, and thus its great covering power renders it useful for wide-angle purposes. The definition over the whole field we found to be extremely fine and uniform. At the aperture named the lens is easily



focussed—a property we have hinted at in the preceding paragraph as not universally met with—and, so far as the camera test on vertical and horizontal lines was concerned, it is quite free from astigmatic errors. By decreasing the aperture to a small extent, the covering power of the lens is increased to a remarkable degree, while the illumination is singularly even. The front combination transposed to the back cell forms a useful single lens of about twice the focal length of the compound.

We may add that the effective aperture (-6) is calculated on the English system. It will be readily understood, from the particulars here given, that the Stigmatic is essentially a 'universal' lens, that is, for the most rapid work, for copying, for landscape, architectural, and general purposes, it answers equally well, and therefore it is assured of high appreciation at the hands of all classes of photographers.

THE 'ABINGDON' ACETYLENE GENERATOR.

R. J. Moss & Co., Conduit-road, Abingdon.

THE principles upon which this generator is constructed may be understood from the following brief description:—

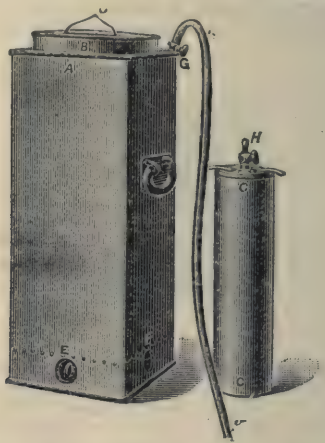
A is the water cistern; B, the gas-holder; C, the generating chamber; D, the central tube from which C has been removed for recharging; E and F, taps to let off the water from condensing chambers; G, the gas outlet; H, air tap for charging purposes.

The illustration represents the apparatus with generating chamber removed for recharging, while in actual operation, supplying light to the two burners; part of the tube connexion is also shown.

The water tank is made square, partly to do away with guides and partly for convenience in transit; when the gas is generated in C, it passes into B, through a down and up pipe connected by a condensing chamber, but is prevented from returning by a water trap; this is one element of safety, the

volume of gas—even though small—being divided into two parts, each so small that an explosion (even if possible) could do no serious damage. This water trap also cools and purifies the gas. When sufficient gas has been made, the gas-holder, B, rises, lifting, at the same time, the carbide in C, when the active production of the gas ceases, to be resumed when the consumption allows the gas-holder to fall.

Should any excess of pressure arise in the generating chamber, that will



immediately rise from the gas-holder and relieve it, returning to the normal position when the excess of gas has passed into the holder. The apparatus can be started full working (two burners) in about two minutes, as nearly all air is expelled in the action of charging, and it can be recharged (if necessary), when in use, without interfering with the supply of gas or putting out the light. The entire apparatus is made of twenty-four gauge iron, and afterwards galvanised; this makes it perfectly sound, and obviates all risk of leakage, while the increased weight gives a good regular pressure. An arrangement for extending the sides of the water cistern prevents the water spilling over.

For lantern work, two sizes are made: 8 inches square by 21 inches high, charge, 1 pound, and 9 inches square by 24 inches high, with a charge of 1½ pound; the latter has supplied eight burners at once for about three-quarters of an hour, so it is suited for photographic work.

THE WATKINS' HAND-CAMERA METER.

R. Field & Co., 142, Suffolk-street, Birmingham.

This neat and handy little meter has been specially designed for shutter work, and possesses the feature that it indicates half the exposure of other patterns of the Watkins' meters. The short instructions given for the use of the hand-camera meter display the principles upon which its construction is based. The numbers of the factors are engraved on concentric circles made in metal, as shown in the cut, and the resulting calculation is easily read off:

Hold the meter to face the light, pull out a fresh surface of sensitive paper,

Taken with Smedley's "Up to Date" Camera and R. R. lens. Cheapest and best.



Collotype, Morgan & Kidd, Richmond.

By W. MARSHALL, Photographer, Henley-on-Thames.

and count how many seconds the exposed tint in centre of meter takes to match in depth the tint alongside. This number is the light value.

The plate speed is given by number in the separate card of plate speeds.

Revolve face of meter so that the number representing speed of plate you are using is opposite the light value.

Then on the other half of circle the correct shutter speed to use will be found opposite the value of stop.



Or, if the shutter speed is decided on, the best stop to use will be found against it.

The shutter speeds are marked with a dash, $20 = \frac{1}{20}$.

Example: Plate 60, light 3, f·11 = $\frac{1}{30}$ shutter speed.

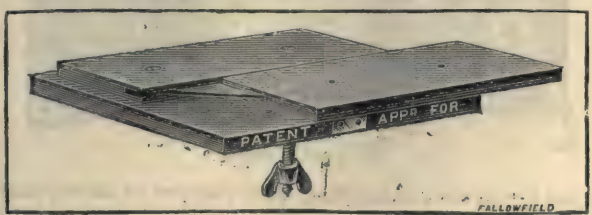
In sea views an exposure $\frac{1}{10}$ that indicated should be used, or a stop if $\frac{1}{10}$ the area; for seashore or snow views, $\frac{1}{4}$.

See that the light tested represents that falling on the subject. Do not test in heavy shadow when the subject is in open light. There is no need to use the meter for each exposure if light is fairly steady.

A STEREOSCOPIC ADAPTER.

Jonathan Fallowfield, 146, Charing Cross-road, W.C.

A USEFUL piece of apparatus, designed in accordance with the principle first suggested by the late Mr. Latimer Clark, for taking binocular photographs with a quarter-plate camera and one lens. It consists of an extra tripod table, having on its upper surfaces a parallel rule, one rule being fixed to the table and the other to the bottom of the camera employed. Thus exposures are



made in two different positions—one with the camera to the right, and the other with the camera moved across to the left side. The adapter is secured to the ordinary tripod top by means of the fly nut shown in the cut, and the camera is screwed on to the movable front by means of the holes shown. By the movement of the camera from side to side, two successive photographs at

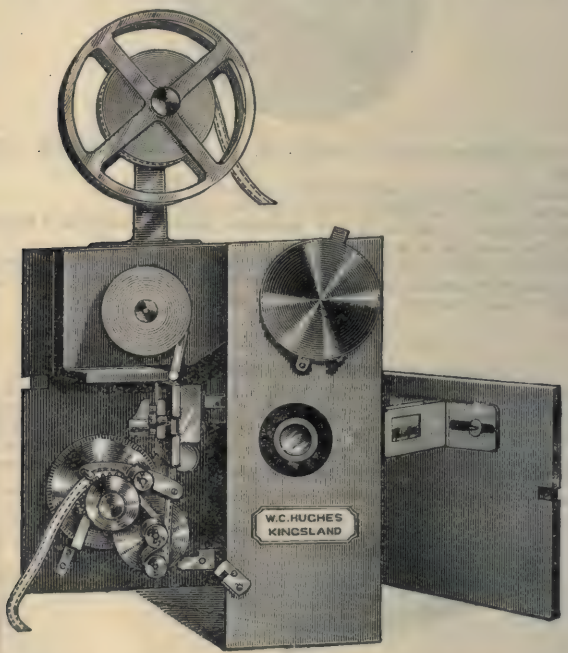
the theoretical distance of separation may be taken of the one view or object, and properly mounted prints from the negatives will give a true stereoscopic effect.

HUGHES'S MOTO-PHOTOSCOPE.

W. C. Hughes, 82, Mortimer-road, Kingsland, N.

AMONG the many advantages claimed for Mr. Hughes's Moto-photoscope are several of a unique character. The instrument is very portable, the case measuring only 11 in. high, 7¾ wide, and 4¾ deep. There is no flicker, because there is no shutter. As no light is cut off, there is perfect illumination. The machine runs easily and smoothly, and the films are never damaged or torn.

The film-winder is unique, as a film can be wound in less than half a



minute; and there is also a compensating shutter, to allow for the irregularities of the perforation.

The wear and tear of the film is practically *nil*, because it is drawn down by the rotary projecting arms and not the sprocket wheel, and the pressure is only about two pounds weight.

The entire mechanical parts are fitted to the door of the Moto-photoscope case, which can be easily opened to allow the operator to change his films,

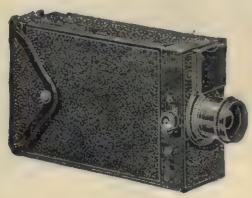
and, while this is proceeding, miniature pictures (specially made) can be exhibited. The effect of this prevents any break in the continuity of the entertainment.

Owing to the perfect balance of the rotary movement, there is no vibration. The machines are supplied to work Edison's gauge.

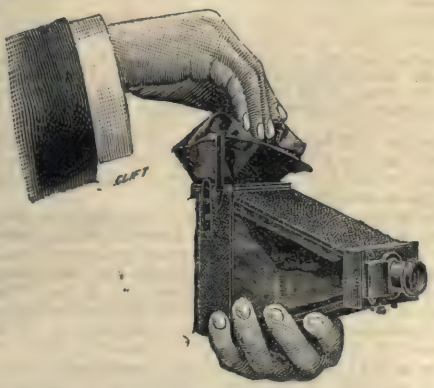
THE 'TRIAD' POCKET CAMERA.

George Houghton & Son, 89, High Holborn, W.C.

THIS is a decidedly useful and effective form of pocket camera. Closed up, as shown in the smaller illustration, it measures $6\frac{1}{2} \times 3\frac{1}{2} \times 1\frac{3}{4}$ inches. Its principal features may be thus summarised: It carries six plates, $3\frac{1}{2} \times 2\frac{1}{2}$ inches, in sheaths, which are contained in a magazine. This magazine measures only



$4\frac{3}{4} \times 3\frac{1}{2} \times 1\frac{3}{8}$ inches, and the two sides supporting the lens and shutter fold on either side of it when closed for carrying. The camera is opened ready for use in a moment, and, after the exposure is made, can be instantly closed. The plates are changed on the bag principle. The sheaths are numbered on the

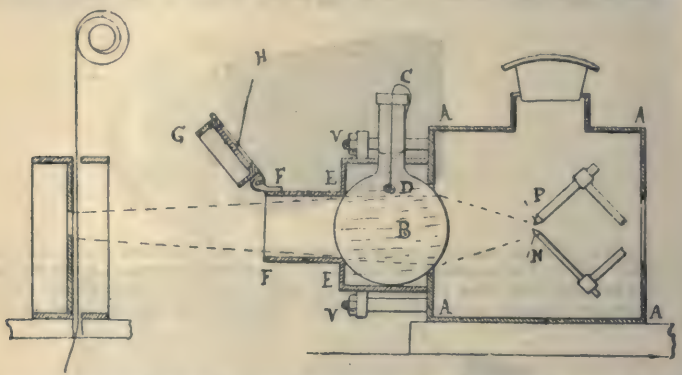


back, and it can be seen how many exposures have been made by means of an aperture, protected by non-actinic glass, in the back of the magazine. A finder, on the well-known principle of sight hole and cross lines, is affixed to the camera, which has a simple and effective time and instantaneous shutter. The Triad is an extremely compact, well-made little instrument.

LUMIÈRE'S SAFETY CONDENSER FOR THE KINEMATOGRAPH.

Fuerst Brothers, 16, Philpot-lane, E.C.

THE lens which has hitherto been used for projecting, and which served to concentrate the luminous rays, also concentrated the heat very strongly upon the film, and the film was liable to be damaged if exposed too long to this heat. Arrangements have therefore been made to avoid this, and it is now replaced by a so-called balloon condenser (a glass globe filled with water). Similar arrangements have already been used, in the shape of square glass troughs interposed between the condenser and the film, such receptacles having flat and parallel sides; but this has proved a very insufficient mode of avoiding the heat, in consequence of the difficulty of making the square trough water-tight, or sometimes, by an oversight, the water has been lost or escaped



AAAA, projecting lantern. B, condensing balloon. C, wire suspending a small piece of coke, D. EE FF, black enamelled metal box to fix the balloon up against the lantern by means of the bolts and nuts, VV. G, stop valve, provided with a movable ground-glass screen, H. PN, electric carbons.

without the operator having noticed it. The danger, therefore, becomes so much greater, as the operator, counting upon the trough, might leave the film stationary whilst it is being illuminated, a thing he would never do if he were using the condensing lens only.

With the balloon globe replacing the condensing lens, the rays of light are concentrated without any appreciable loss of lighting power, and it absorbs the greater part of the heat rays. During an hour of continued projection, the water comes to a boiling point without the least inconvenience. The temperature remains constant, and rises very little. The light, by this arrangement, is whiter, and the effect of the greenish colouration of the light caused by the condensing lens is altogether suppressed. If the balloon globe has to be removed for any reason, or if the water runs away or evaporates, no condensation of light rays takes place, and consequently the operator need not be afraid of any heat on the film. Thanks to this arrangement, it becomes impossible to commit serious mistakes, the whole concentration being produced by the neutral body which absorbs the heat rays.

To avoid projecting when the water is at boiling point, it is sufficient to suspend a small piece of coke (attached to a wire) into the globe, and the evaporisation of the water then goes on with the greatest regularity.

M'KELLEN'S 'INFALLIBLE' HAND CAMERA.

Thompson & Co., 4, Bull's Head-yard, Manchester.

THE leading features of the 'Infallible' may be thus briefly set forth. It takes either plates or films in sheaths, at the bottom corners of which are projecting pins, which fit in grooved guide plates on each side of the camera. At the end of each groove is a circular hollow, having a revolving circular disc mounted on a shaft. As the sheaths are pressed forward by back springs, the pins of the first sheath bear against the discs, while the top of the sheath

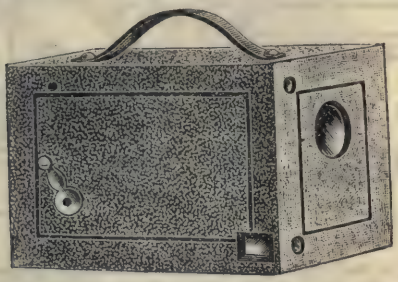


FIG. 1.

bears against a stop rail at the top of the camera. The discs have each a notch cut in them capable of receiving the sheath pins. The notches stand exactly opposite the grooves, and the pins of the front sheath, being pressed from behind by the springs, pass into the notches, where they remain till after the front plate is exposed.

Immediately after exposure, the key is turned steadily forward to the right as far as it will go. This movement causes the pins, which are in the notches,

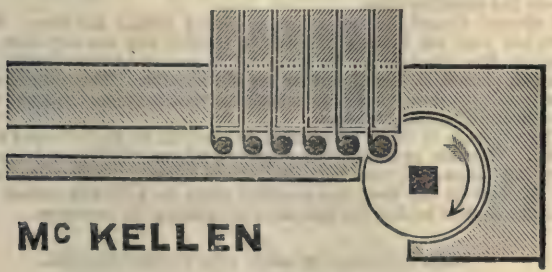


FIG. 2

to be carried forwards and downwards until the sheath has left the stop rail, when the top portion of the plate in its sheath falls forward into the receiver.

The discs still continuing their circular motion, the notches and pins arrive at the position when the pins are free to leave the notches; the whole sheath then deposits itself face downwards in the receiver.

As the sheath falls down, it is held in position by a gripper, which securely

holds each last sheath as it falls, so that there is no movement of the sheaths in the body of the camera. The illustrations, 2 and 3, clearly indicate the changing mechanism. An indicator, an automatic cut-off for preventing

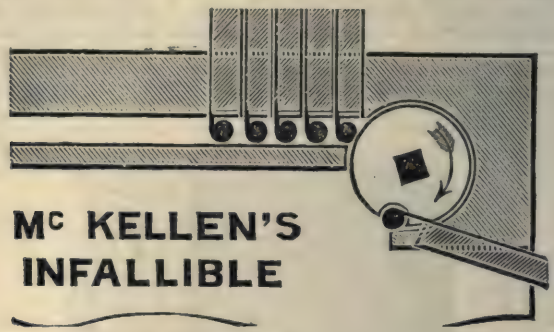


FIG. 3.

access of light to the plates when it is desired to open the front of the camera, and an extremely simple and ingenious lever shutter are also fitted to the camera, which in use probably gives the photographer less to do or think about than most cameras.

THE 'INFALLIBLE' REFLECTING HAND CAMERA.—The Infallible camera is also adapted to work on the reflector principle. Its chief features are that a ground-glass focussing screen, the full size of the sensitive plate, lies on the top of the camera. A reflecting mirror is hinged at the angle formed by the sensitive plate and this ground glass. It is set in an oblique position, exactly bisecting the angle in which it is hinged, by drawing a cord down till a click is heard. In this position it intercepts all light passing through the lens, and so protects the sensitive plate.

A shutter, formed by two wings, is placed behind the lens. When the mirror has been set this shutter can be opened, and the rays from the lens, falling on the reflector, are thrown on the ground glass at the top, showing there the picture as it will appear on the negative. This shutter cannot be opened until the mirror is set, thus ensuring that the plate shall not be spoiled by accidentally opening the lens.

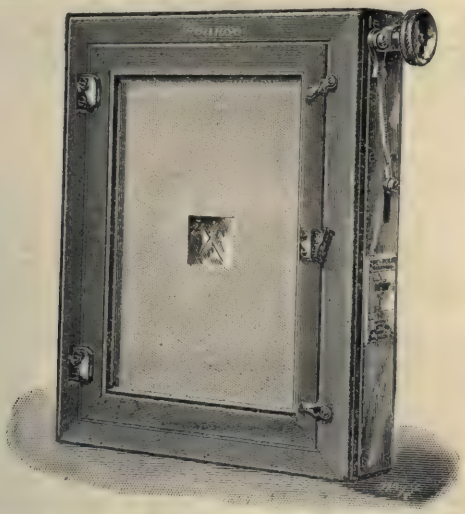
The exposure is made by pressing the button on the left-hand side of the camera. This sets in motion the reflecting mirror, which, revolving about its hinged side as an axis, rises to the top of the camera, suffers the rays of light from the lens to fall upon the sensitive plate for a definite period, and then closes the shutter behind the lens, thus completing the exposure.

THE PENROSE SCREEN AND PLATE-HOLDER.

Penrose & Co., 8, Upper Baker-street, W.C.

THE particular object Messrs. Penrose have had in view in making this slide has been to provide a means by which any one desiring to work the half-tone process on a small scale may be able to do so with any existing camera, instead of being deterred by the heavy expense of a special camera. The screen and plate-holder is made as closely as possible to the usual sizes of dark slides of ordinary cameras, so that with an adapter it will fit most cameras. The slide is somewhat thicker than an ordinary one, to allow for the mechanism

for moving the screen, and, to avoid altering the register of the ground glass, there is provided a separate ground-glass frame, which fits into the slide in the



plane of the sensitive plate. When the focussing has been done and the screen adjusted, the shutters of the slide are reinserted and the plate put in.

AN X-RAY METER.

Reynolds & Branson, Leeds.

This little instrument supplies a definite means of comparing the actinic power of the radiations emanating from excited tubes used in X-ray work. A quadrant of aluminium is made in concentric terraces, the thickness ranging

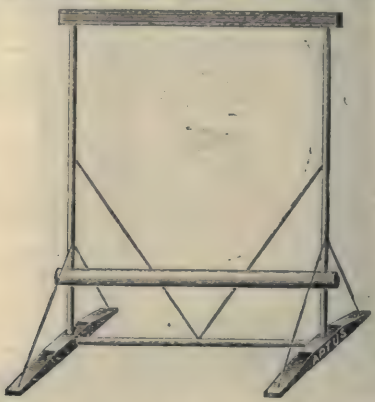


from one to ten millimetres. By placing this meter between the excited tube and a phosphorescent screen, the thickness of aluminium which the rays can pass through can be seen on the screen. The meter, therefore, gives an easy method of comparing the intensity of the rays emitted by different tubes, and the same tubes at different times.

THE 'APTUS' COMBINATION LANTERN SCREEN AND BACKGROUND.

Sharp & Hitchmough, Dale-street, Liverpool.

THE combination of lantern screen and background is absolutely opaque, the screen side being pure white, while the background side is coloured to a suitable tint for photographic purposes. The material of which it is made is

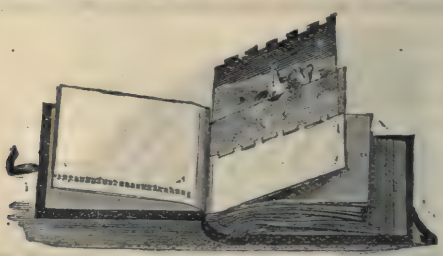


seamless. The illustration shows it mounted on a portable elevator, which may be readily set up or taken down. The latter piece of apparatus, which would be found useful by both professional and amateur photographers, is supplied separately; but the screen background is mounted on rollers, top and bottom.

BECK'S FILM-STORING NEGATIVE ALBUM.

R. & J. Beck, 68, Cornhill.

THIS handy little album includes within its covers a hundred numbered envelopes for holding film negatives, and a numerical index. The space



occupied is very small, and, the envelopes being made of specially thin paper, are transparent, so that it is not necessary to remove a negative from its envelope in order to identify it. Photographers who work films will appreciate this convenient storing album.

THE 'AUTO' ACETYLENE GAS-GENERATOR.

The Scottish Acetylene Gas Co., Glasgow.

THE chief advantages claimed for this form of apparatus for generating acetylene for photographic illuminating purposes are that the gas is cooled in the generator itself, and is therefore delivered into the gas-holder *quite dry* and ready for use; there is thus no trouble by the pipes choking with condensed moisture. There is ample storage capacity, and no gas is lost. The supply of gas is regulated to a *nicety* by the automatic regulator, exactly in proportion to the quantity of gas consumed. The supply of gas and light can be kept up continuously, as the generator can be recharged while the lights are burning. There is no danger as the pressure in no part of the machine ever exceeds four inches of water. The method of using the Auto generator may be understood from the following directions:—



The generator is packed inside the gas-holder. Fix the generator on to the cocks on the bottom of the container by the screwed couplings, and see that the catch at the bottom of generator faces out. Place the gas-holder in the container and slip the guide rods into their sockets. The regulating rod must be pushed up through the eye on regulating lever and secured to the bracket on top of gas-holder by the nut. Fill the container with water till it is just level with the top of gas-holder when quite down. Fill the water jacket. Fill seal can up to the inside with water. Shut all cocks. Place the charge of carbide, broken to about the size of a hazel nut, in the carbide box, and push it up into generator, securing it by a turn to the right. Lift up seal can and hook it on. Open the middle cock. Unhook the regulating lever and press it down. The machine will now make gas and regulate itself. When the charge of carbide is exhausted, the machine may be recharged as at first, taking care to shut the middle cock, and hook up the regulating lever. Should the machine be left set up at any time, hook up the lever till it is again wanted for use. To adjust the regulator, should the machine not be making gas fast enough, bend the spring on end of regulating lever inwards a little; if too much gas is being made, bend the spring outwards a little.

BAUSCH & LOMB'S RAY FILTER.

A. E. Staley & Co., 35, Aldermanbury, E.C.

THIS ray filter is designed to take the place of the yellow screen in orthochromatic work. It consists of two thin pieces of optical glass, the surfaces of which have been ground and polished plane and parallel. Between these plates is cemented a glass ring of uniform thickness throughout, forming a cell of proper depth, in which is contained bichromate of potash solution. The glass part is mounted in a neat metal ring, which protects it and holds the filter firmly in the proper position upon the *front of the lens*. It is recommended that the filter should not be placed at the diaphragm of the lens, as any refraction caused by it would be greatly magnified in the image; nor at

the back of the lens, being in that position inaccessible if it is desired to make a quick change for instantaneous work. The following instructions are given for changing the solution in the cell: Remove the metal ring which holds the cell in the mounting by inserting the tip of a blunt knife blade under it where the two ends meet, and lift one end out; carefully remove the cell from the mounting; lift off metal plate and rubber band, using care not to lose either; hold the cell with the holes down and remove the desired quantity of fluid with



the pipette; to refill the cell, hold the cell so that the holes will be uppermost, and introduce the solution through one hole until all the air and one drop of fluid have been expelled through the other; place rubber band over both holes; place metal plate on rubber band so that the two studs will be directly over holes, and, pressing between and beneath edge of glass discs, slide into the mounting. Do not allow the ray filter to freeze. With the filter a supply of the standard bichromate solution and a pipette are given, and Messrs. Bausch & Lomb have prepared an explanatory pamphlet, illustrated by photographs, taken with and without the filter, showing the advantages gained in the employment of colour-corrected plates when exposed to filtered light.

THE 'AMBER' CAMERA.

The Thornton-Pickard Manufacturing Company, Altrincham, near Manchester.

THE Amber is of the now familiar conical-bellows form, and is extremely light and portable. It is fitted with a turntable, and, by the simple pressure of two springs on the camera front and the elevation of the stretchers, the front folds down into the open base-board without detaching. The front has an independent rising movement, and can be inclined to give the necessary swing that may be required. The shutter—one of the firm's well-known blind instruments—is fitted behind the lens.

By means of screw adjustments, an extension of some seventeen inches is obtainable, while, on the other hand, the instrument, when racked in, is so compact as to allow of the use of extremely short-focus lenses. The back, of course, has a swing movement, and also reverses, while other special features of the camera may be briefly indicated as self-locking stretchers, a spring-hinged detachable focussing screen, a plump indicator, and a focussing scale

for hand-camera work, thus constituting the Amber really a photographic luxury.

Perhaps the most novel feature of the camera lies in the way in which the dark slide is manipulated. The slides are of 'solid' form, the plates being inserted from the front and firmly held by spring catches. The slide, as



shown in the illustration, slips in from the top between the screen and the camera. No side-push is necessary, and the slide is removed by merely lifting the spring bar at the top which holds it in position. We can testify to the fact that the movement is a very simple and effective one, working well in practice, and, when the camera is slung round the neck by means of a strap for hand-camera work, is a great convenience.

BECK'S FILM-DEVELOPING DISCS.

R. & J. Beck, 68, Cornhill.

THOSE who have experienced the peculiar sensation of attempting to develop several 'cut,' or rollable film negatives in one dish will appreciate these little discs, which are designed to keep the films under the developer, and prevent

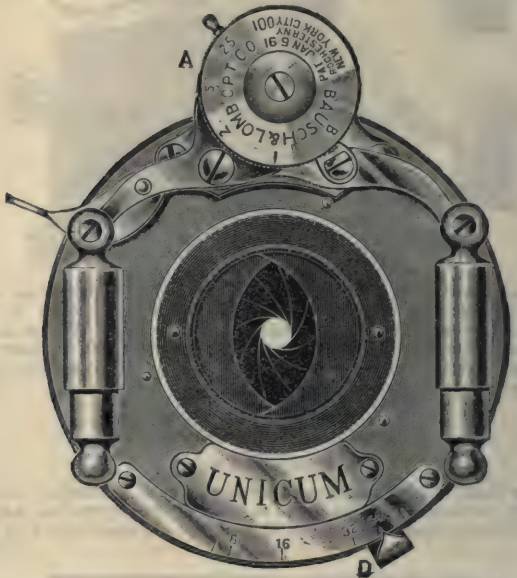


them from slipping one over another. They consist of thin metal discs with corrugated centre pieces which may be attached to the corners of the films. The discs are so small, neat, and handy, that a box of them should infallibly find a place in the amateur's dark room.

BAUSCH & LOMB'S NEW TIME AND INSTANTANEOUS SHUTTER.

A. E. Staley & Co., 35, Aldermanbury, E.C.

THIS shutter is the result of a lengthened study to produce a low-priced instrument, perfect in its working and construction. In appearance it differs very little from the shutter which has been now for some years before the photographic public. It has both pneumatic and finger release, and instantaneous exposures of various rapidities can be given. By adjusting the controlling dial,



any exposure may be given while retaining the pressure on the ball, or, by further adjustment, indefinite exposures may be given at pleasure. The shutter is of high-class workmanship, neat in appearance, and compact, fitting between the combinations of lenses. At the present time only two sizes are ready, viz., 5×4 and 7×5.

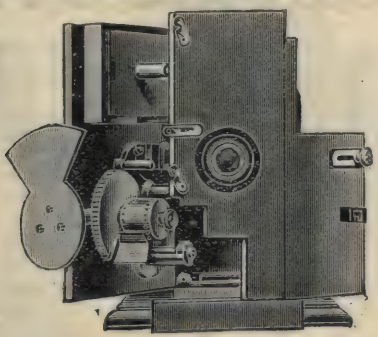
THE PRESTWICH MOTO-PHOTOSCOPE.

The Prestwich Manufacturing Co., 744, High-road, Tottenham.

THE Prestwich Moto-photoscope is very small and compact, and, besides being used as a camera, answers also, with a little adaptation, for either projecting the positives or printing from the negatives in contact. The essential movement, that for passing the film behind the lens, is simple, novel, and effective, and a brief trial of the machine as well as an inspection of the results convinces us that the instrument is a thoroughly good one—it is comparatively noiseless, does not tear the film, and in size is not much larger than many

hand cameras. Moreover, it is extremely well made and finished, and is cheap. An adjustable focal plane shutter is fitted to the camera, admitting of exposures ranging from the tenth to the 1500th of a second.

The illustration depicts the No. 2 Prestwich Projector, which is one of



five different models, designed to carry from 75 to 2000 ft. of film. The Prestwich Cameras and Projectors are made entirely of gun-metal and steel, and are fitted to best mahogany polished cases. For the longer lengths of film the automatic feed is fitted, so the film runs evenly all through. Detachable shutters are also an advantage, as some films show very much better without. Detachable sprockets made in several different gauges to suit the varying gauges are essential to perfect registration, the operation of changing taking but a few seconds.

The movement to all these projectors is a six to one, *i.e.*, the film is stationary five-sixths, and is being changed in the remaining one-sixth, so that the shutter used is but a very small one, and only one-sixth of the light obstruction, which reduces flicker to a minimum.

With the No. 2 Projector small title slides can be shown during the changing of another film, which can be rewound in ten seconds by a special winding device on the machine.

MALONI'S FLASHLIGHT APPARATUS.

G. Houghton & Son, 89, High Holborn, W.C.

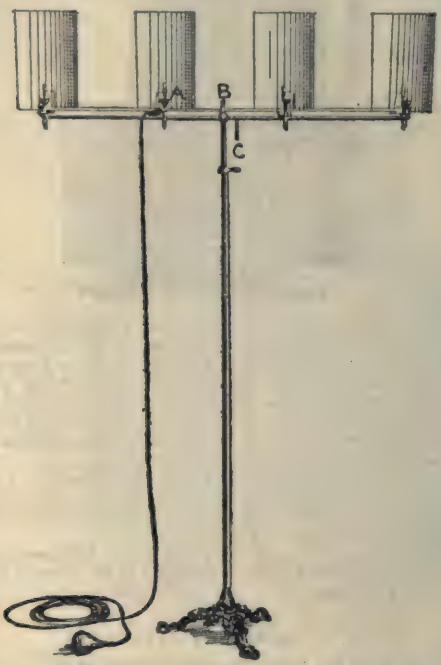
THIS method of making flashlight exposures is somewhat of a novelty. In the small cups shown on the cross rod, charges of a mixture of magnesium and a potash salt are placed, and ignition is effected by squeegeeing the pneumatic ball, which actuates a series of wires that have been heated in Bunsen flames. An exposure of about a fiftieth of a second is thus obtainable. The following are the instructions for using the apparatus:—

Fix up the apparatus as shown in illustration, attach the large rubber tube to C, and to an ordinary gas bracket, after first removing the burner. There must be a full pressure of gas, and sufficient supply to give a full-size flame to the four Bray burners; also to make the four Bunsen flames touch and heat the forked wires to whiteness. The igniting wires are correctly adjusted before sending out the machines, and their exact position when down in the cups should be carefully noted, as a guide when fixing in new ones.

The four lights should flash exactly together, and to cause this the fou

forks must all enter the cup simultaneously, but must not go within one-eighth of an inch of the bottom of the cups.

To make the exposure, place the powder in the cups—the quantity depends upon the amount of light required—about half full is enough for sitting figures (for full-length and groups use more), using plates of medium speed, with pyro-soda development, and lens aperture about *f*-8. Before charging



the cups, press down the lever at A till it is caught and held in place by the spring catch. Then, when ready to expose, uncap the lens and press the pneumatic ball, which may, for convenience, be hung on the camera stand. Owing to the amount of light given for the small amount of powder, there is comparatively little smoke, so that the apparatus can be used conveniently in a small room or studio if there is a small ventilation.

PORTABLE PHOTOGRAPHIC STUDIOS AND DARK ROOMS.

E. C. Walton & Co., Muskham, Newark.

Messrs. Walton, who manufacture portable buildings for horticultural and a variety of other purposes, also make a speciality of studios, specially built for photographic use. The illustration shows one of these studios, which is constructed of the best 3 × 2-inch framing. The sides and ends are covered

on the outside with ¾-inch planed, tongued, and grooved boards. The roof is partly of glass, which can be had of what proportion desired at no extra charge. If no special instructions are given, Messrs. Walton make about one-third of the roof glass, the remainder is lined with matchboard, and

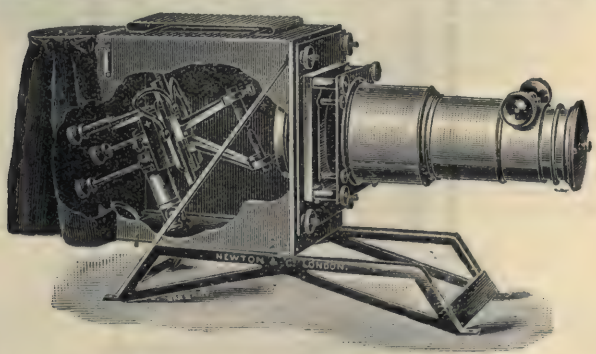


covered with patent felt that requires no tarring. The floor is of ⅞-tongued and grooved boards, on 3 × 2 inch or 4 × 2 inch joists. Panel door with rim lock and brass fittings; sash made to open in roof or side as desired; ornamental barge boards, finials, glass, bolts, and other necessary ironwork are included. All the buildings are carefully put together before dispatch, and each section is marked for easy re-erection.

THE 'INDIAN' LANTERN.

Newton & Co., 3, Fleet-street, E.C.

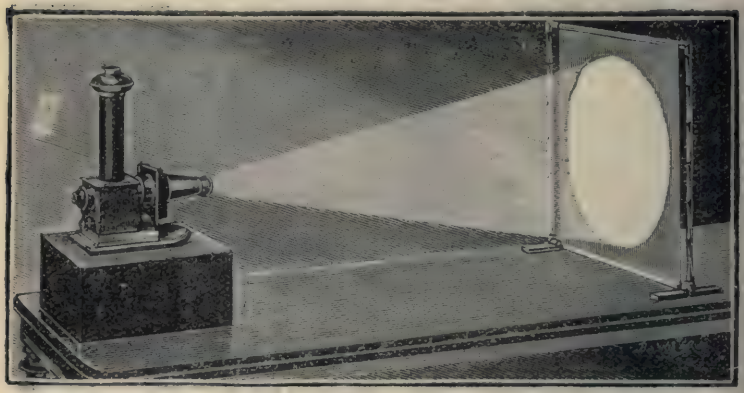
THIS new lantern has been designed for use in the tropics and in hot, damp climates, where wood and iron warp and rust. It is made entirely of brass,



and is fitted with the finest long-range lenses, suitable for either electric or lime light, and the construction is such that the entire cover can be removed in a moment without disturbing the light or the optical portions. This lantern is specially intended for use in India.

'PRIMUS' DRAWING-ROOM LANTERN AND SCREEN.

Butcher & Son, Blackheath.



THE 'Primus' P K Lantern is specially constructed for the exhibition of lantern slides made from negatives taken with the Pocket Kodak Camera, and is designed for use, on the table, in the drawing or dining-room.

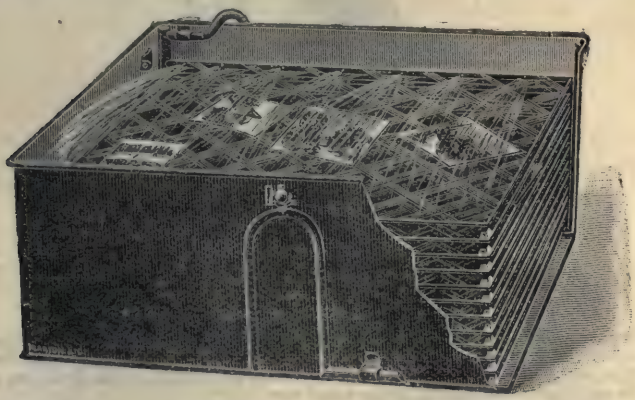


The second illustration depicts the 'Primus' P-K or Drawing-room Table Lantern Screen. It gives a picture three feet square, and stands on the ordinary dining-room table. The screen is hung on a portable bamboo frame, which takes to pieces in a minute or two, and packs up into a neat box. It is very compact, and the total weight is only 3 lbs.

SIMPSON'S PRINT-WASHER.

Marion & Co., Soho-square, W.

THE improved Sectional Print-washer, patented by Mr. Simpson, and manufactured by Messrs. Marion & Co., is composed of a series of frames latticed with linen tape, on which the prints (or negative films) are laid and kept from contact with each other. Each frame has at one side a tube pierced with holes, and is connected with the supply pipe; the water rushes through these tubes and through the pierced holes, thus giving a good spray of water for each frame and the prints thereon. The frames are arranged a little



distance apart, and are contained in a tank, japanned inside and out, and also furnished with a syphon.

The outlet will act either as an overflow or as a syphon, in the latter case the little tap at the top must be turned off. By closing the outlet with finger *before* turning the tap, the syphon will start even with a very small flow of water. The system here adopted for washing prints should answer well in practice.

THE BON-ACCORD ACETYLENE GENERATOR.

A. & J. Smith, 23-25, St. Nicholas-street, Aberdeen.

THIS generator consists of an outer vessel, into which fits loosely a gas-holder, within which is a perforated tube, removable for charging with calcium carbide. Attached is the condenser, having two taps, upper and lower.

The method of using the generator will be understood from the following directions:—Lift out the gas-holder and fill the outer vessel with clean water up to three inches from the top. Take out the perforated tube, and three-quarters fill it with broken calcium carbide, slip the tube up the guide rods of the gas-holder, and, when it is as far as it will go give it a quarter turn and

pull down, when it will be found to be fixed. Open the upper tap, and place the gas-holder in the outer jacket. It will sink a little, and then rise again. As soon as it begins to rise shut off the tap. Connect the burner by means of rubber tubing, open the upper tap and the burner tap, and apply a light to the



burner. The presence of air in the apparatus at first causes a blue flame. After a few minutes the light will be brilliant and dazzling. Regulate the light with the burner tap until the best effect is obtained. The light can then be centered in the lantern in the usual way.

The generator does not give off any smell, and a light of 200 candle power is said to be obtained with it.

A SLIDING-FRONT COMBINATION CAMERA.

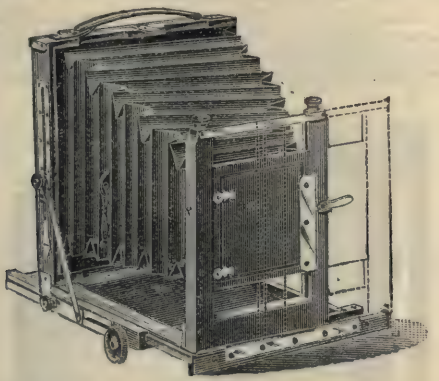
Holmes Bros., 33, Barnsbury-road, N.

STEREOSCOPIC photographers will appreciate the novel method of giving the lens front a lateral movement, which is a feature of this camera. The sliding arrangement is capable of travelling from one side of the camera to the other, or it can be fixed in any desired position by clamping rods. This lateral movement, applied to a conical-bellows camera, renders the instrument capable of taking two quarter-plate pictures on a half-plate. The dark slides are also adapted to take stereoscopic plates.

To secure accuracy in fixing the front in position for binocular work, it is marked in the two places on which the lens must be centered, and is stamped with the word 'centre.'

The body has reversible back, and can be used with wide-angle lenses. It measures $1\frac{5}{8}$ inches thick when closed, and 9 inches square over all, and extends 16 inches; the weight is about 3 lbs.

A sliding panel is fixed on the back of the camera for covering up one half of the plate when an exposure is made. Obviously this system only allows of

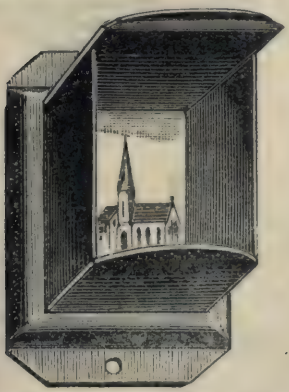


the stereoscopic reproduction of objects not in motion; but, of course, it can be employed so as to obviate the transposition of the prints in making the stereoscopic slides.

THE BIRKBECK FINDER SHADE.

E. G. Platt, Birkbeck-road, Dalston, E.

THE illustration depicts a useful adjunct to a finder, viz., a collapsible shade, which is shown open. When closed, by the mere raising of one flap, the whole





immediately springs up into a firm position. The flap closes down flat by a slight pressure. For excluding extraneous light from the finder image this four-sided collapsible shade should be found of considerable service.

SALMON'S ADJUSTABLE VIGNETTER.

Marion & Co., Soho-square, W.

UTILITY and efficiency are the characteristics of this extremely handy vignetter. Two thin metal strips are screwed on to the printing frame, and a light grooved frame, for holding the vignetting cards and the diffuser, readily slips into the grooves. The vignetting cards can be easily changed, inclined

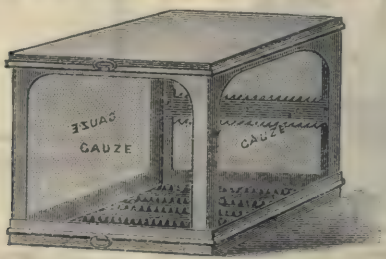


at an angle or at a fixed distance from the negative. The vignetter is useful for silver or bromide vignettes, and is excellent for printing from thin negatives when vignettes are not required, using the light-diffuser only and without the vignetting card. The vignetter may be used in connexion with any ordinary printing frame, and does not interfere with the general use.

THE D. A. DRYING BOX.

David Allan, 157, Whitfield-street, Fitzroy-square.

THE frame of this drier, when not in use, collapses and folds flat. It is



covered with fine gauze, which effectually excludes dust and other particles. Inside there are two rows of grooving for supporting the plates. It

manifest that plates may thus be dried in the open air, and the operation consequently very greatly accelerated. The drier is beautifully made in

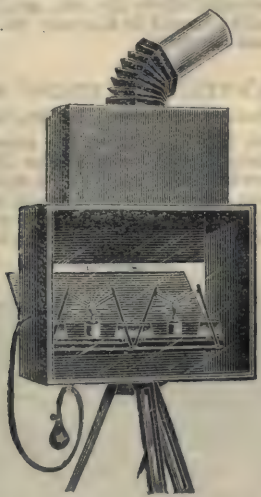


japanned metal, and is one of the neatest and handiest photographic devices we have recently seen.

SALMON'S PORTABLE MAGNESIUM LAMP.

A. Salmon & Son, 169, Hampstead-road, N.W.

THE principle availed of in this lamp, which is glazed with corrugated glass, is the ignition, by pneumatic means, of strips of magnesium supported on metal arms. The lamp is noiseless, and all the smoke and smell produced by combustion of the magnesium are conducted away through any available outlet in



the studio by a portable telescopic chimney, which can be inclined in any direction. The lamp shuts up in cabinet form when not in use, the chimney packing with the stand. The lamp is capable of giving a series of powerful lights, each of several seconds' duration, or the whole series can be fired simultaneously, and thus a very short exposure may be obtained.

THE 'YALUS' HAND CAMERA.

Adams & Co., Charing Cross-road, W.C.

THIS is a low-priced hand camera of great excellence. Among its principal features may be mentioned a self-capping ever-set shutter, which admits of time and instantaneous exposures, and is regulated for various speeds, two

finders, showing a brilliant image, and an excellent single lens. It takes sheaths for plates or films, and this brings us to the changing method, one of the simplest, as it appears one of the most certain yet devised and introduced.

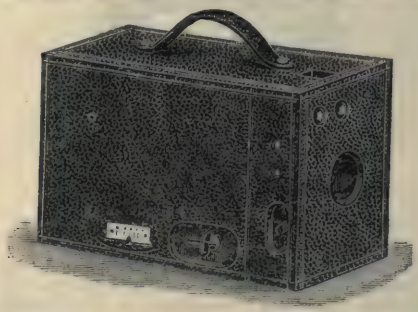


The sheaths bear against an inclined plane, the consequence being that the front sheath is always elevated above the rest, and, being readily grasped through a cloth bag, is easily removed to the rear, No. 2 sheath then being ready, and so on throughout the twelve.

THE 'BULL'S-EYE' AND 'BULLET' KODAKS.

The Eastman Photographic Materials Co., 115, Oxford-street.

THESE two little cameras, though built on the same lines, yet have one important point of difference, for, whereas the Bull's-eye is designed exclusively for taking cartridge film, which can be unloaded and reloaded in daylight, the Bullet is also adapted for glass plates in dark slides. In the latter case, the change from film to plates can be made in a few seconds, a door in the side of the Bullet opening to receive the plate-holder. The No. 4



size of the Bull's eye and the No. 4 of the Bullet take 5 × 4 pictures, and each camera has two view-finders and two sockets for the tripod screw, so that vertical and horizontal pictures can be taken. There is also an accurately adjusted focussing scale. The single achromatic lenses are of excellent quality, and have a set of three stops. Snap-shot or time exposures are given by means of a rotary shutter, which is always set, and is actuated simply by pushing a lever to the right or to the left, alternately. Near the exposure lever are slides for controlling stops and time movement.

THE 'CHALLENGE' FILM CARRIER.

J. Lizars, 101, Buchanan-street, Glasgow.

THIS is a simple and easily used carrier for films, which furnishes the acme of convenience. At the outer edges of the carrier are movable catches which,



when the film is placed in position, are turned back and hold the film securely in contact. Those who employ cut films will appreciate this excellent little carrier.

THE 'KALOS' SHUTTER.

Price, Hill, & Co., 4, Berry-street, Clerkenwell-road, E.C.

THE 'Kalos' shutter is fitted with a pneumatic speed regulator, which ensures all exposures being given with exactness, and is constructed entirely in aluminium. Both time and instantaneous exposures can be given by altering

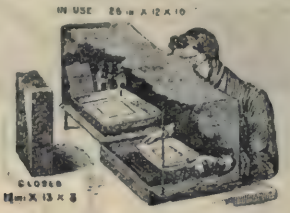


the lever to the desired speed. There is a noticeable absence of vibration in the movement of the shutter, which clamps on to the front of the lens mount, and is extremely light and portable. It is an effective and ingenious little shutter.

BAKER'S TOURISTS' DEVELOPING TENT.

W. R. Baker, Wallington, Surrey.

THIS is made in polished mahogany, and is provided with the same kind of eyepiece that the changing bag has. When open it is about 24 in. long by 10 wide, and 12 high, without the zinc sink, which is 2½ in deep. When closed, it forms a box 12 in square by 3½, in which the collapsible parts

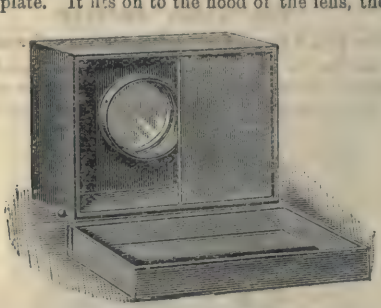


of the tent occupy so little space that there is still room for one dozen half plates, two developing dishes, two six ounce bottles, and several small articles. The sides of the tent are composed of perfectly opaque material, and as the light can only enter by the red window, which is guarded by a blind, its amount can be regulated as desired.

TYLAR'S DUPLICATOR.

William Tylar, High-street, Aston, Birmingham.

THIS is a simple device for enabling a person to be photographed in two positions on one plate. It fits on to the hood of the lens, the cork back being



cut out for the purpose. The sitter is posed and an exposure made; then the sitter's position is altered, and the sliding partition pulled over and the second exposure made. The lid acts as a cap, and is used after each exposure.

THE MOTORGRAPH.

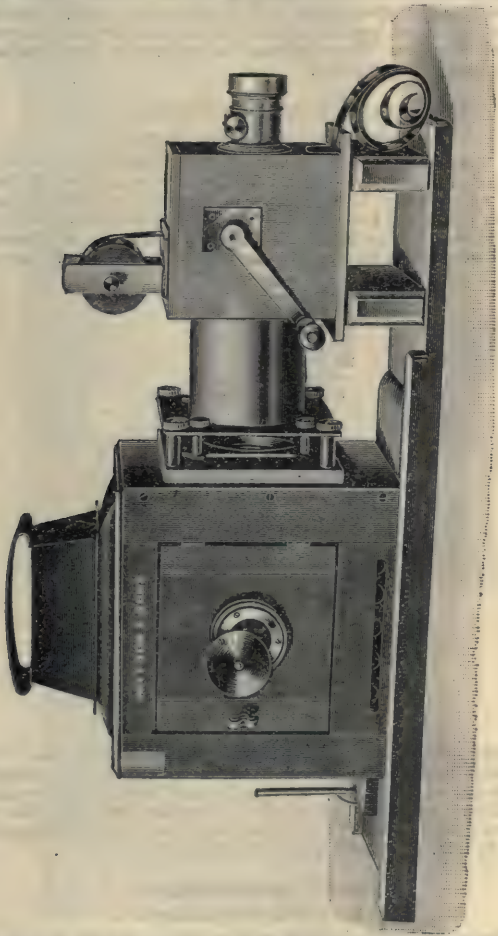
W. Watson & Sons, 313, High Holborn, W.C.

THE principal feature of the Motorgraph is that it is contained in a box, the dimensions of which are $6 \times 4\frac{3}{8} \times 5\frac{1}{2}$, and that it can be attached to any form of lantern. It is designed for photographing as well as for projecting. It is steady, and free from vibration. The shutter permits of an exceptional

amount of light being passed. The sprocket wheel fits the 'Edison' perforations, this gauge being the universally adopted one.

The instructions for working are as follows:—

To attach it to an ordinary magic lantern, the front lens of the lantern



must be removed, and the Motorgraph placed close to the front tube, from which the lens has been detached. It will be well that the lantern be mounted upon a baseboard, having two fixed blocks at one end, on which the

Motorgraph can be fixed to the exact optical centre of the lantern. To insert the film, the film is placed upon the centre pin as shown in illustration, and is pushed through the slot in the top of the machine. While this is being done, a flap, which is held in position by a spring, must be pulled back, the film passing between this flap and the fixed metal strip. The film should be gently urged downwards until it reaches the sprocket wheel; the spring flap is then closed, and the handle turned until the film comes through the front of the machine. The position of the picture can then be adjusted by again holding back the spring flap.

THE 'ELLIS' PORTABLE STUDIO STAND.

W. Watson & Sons, 313, High Holborn, W.C.

THIS studio stand, made to the design of Mr. Alfred Ellis, consists of a complete tripod of the usual shape, with triangular top, in which form it is available as an ordinary field tripod. In addition, a studio table top is supplied, with tilting and lowering movement by means of an endless screw, and a threefold base for strutting the legs firmly apart, this base being fitted with castors covered with indiarubber, on which the whole structure moves.



The legs having sliding adjustment, the camera can be worked either very low down or at its fullest extent. The centre of the triangular top is turned out so that a camera can be placed upon it with the lens projecting through. This will be found very convenient for photographing jewellery and other objects requiring even illumination. The height of the stand is 4 ft. 6 in., and when shut down 2 ft. 6 in. The total weight with studio top is 13 lbs.

LUMIERE'S CINEMATOGRAPH.

Fuerst Brothers, 17, Philpot-lane, E.C.

MESSRS. FUERST BROTHERS recently gave us an opportunity of examining in detail the mechanism, which is excellent in all respects, of the Lumière Cinematograph, of which the most essential features are here described.

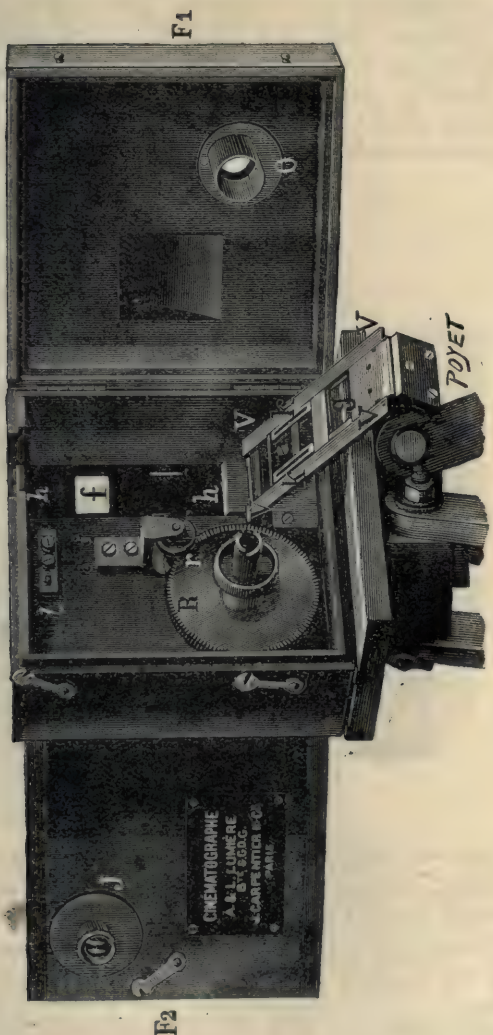


FIG. 1.

The Cinematograph is actually composed of (1) the eccentric crank, R, (fig. 1), (2) the sprocket frame and sprockets. Whilst the crank rotates once, the eccentric transmission rotates eight times. The crank is manipulated by a handle which the operator must turn very regularly, about two turns per second, consequently the eccentric transmission will make sixteen turns per second. Above the crank, R, is a small friction roller, *r*, coated with leather on the surface. The use of this is explained later when obtaining the negative. The triangular eccentric is fixed behind the transmission, and moves the sprockets continuously in a circle. The movements of these sprockets during

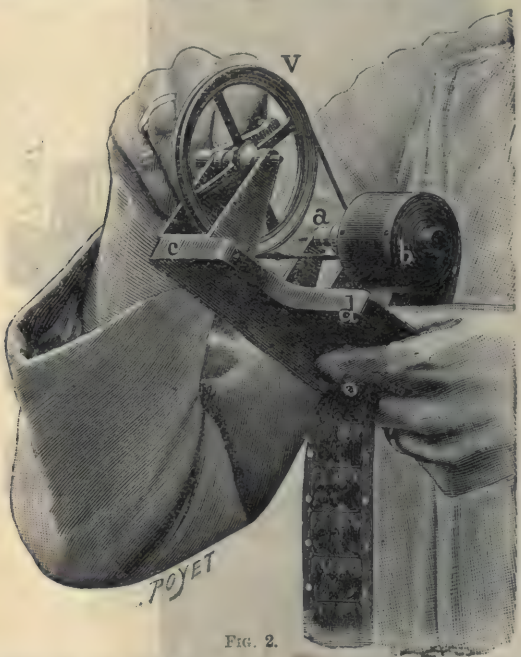


FIG. 2.

their rotation are slightly deformed, so as to engage the film in one case, and in the other case to disengage it. At the end of the crank is fixed a shutter, which is composed of two light metallic sections which can be regulated so as to increase or decrease the size of same. The nut keeping this shutter in position *turns to the left*, and not to the right, as is usual.

The sprocket frame is made of thin steel, having a rectangular opening in which is inserted the triangular eccentric. It has at its upper and lower extremity two rectilinear guides, allowing easy sliding without, however, giving any play. In this manner the frame, under the action of the eccentric, receives an alternative movement. On the side and horizontally the frame is extended for the purpose of holding the sprockets. These sprockets are uided perpendicularly in a most perfect way.

Respecting accessory mechanical parts, v v v v (fig. 1) shows the bridge-like arrangement on hinges which can be lowered or kept in position by a latch.

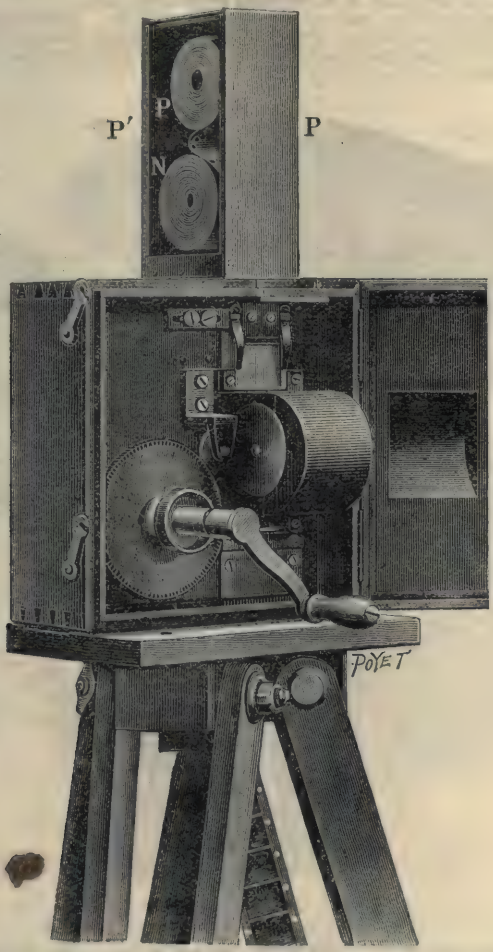


FIG. 3.

This bridging has two springs, KK, within which the sprockets play. It also has a square glass, G, provided with springs, which presses lightly on the film when operated, so as to avoid any damage to the film in case of any unforeseen

accident. The wall, H H, is provided with velvet to keep the film from deteriorating, and on the upper part of this wall is a rectangular window, F, which allows the image to be projected or photographed.

The whole of the camera is mounted in walnut. The circular hole, J, allows either the insertion of the negative or projecting lens, and the circular opening, O, allows the insertion of the handle when the camera is closed and is used for photographing.

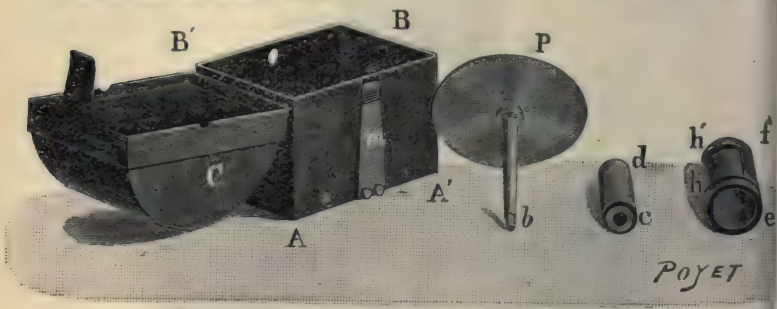


FIG. 4.

To obtain the negative it is necessary to have a tripod, a dark slide, a receiving slide, and a film-roller (fig. 4). The dark slide is made of wood, and contains the film before exposure. The receiving slide is entirely made of metal, and is destined to roll up the exposed film as it is unrolled when photographing. In the inside of this slide is a roller with two hooks, on to

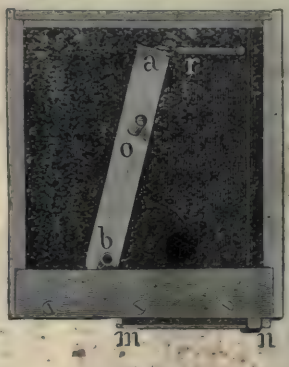


FIG. 5.

which the two foremost holes on the film are hooked. This receiving slide is fixed to the aforesaid bridging on the camera. The film-roller is used for rolling the film by hand. The film is introduced into a slit on the roller subsequently rolled, and thus about fifty to sixty feet of film are rolled in a few seconds.

For the purpose of making the positives a dark slide, P P (fig. 3), is used. This dark slide has two axles. On the lower axle the negative, N, is placed emulsion side outwards, and around the upper side the sensitive film, P, emulsion side inwards. The two ends are passed through the slit in the box. Subsequently proceed to expose the same as for negatives, only with this difference, that the positive film alone is introduced into the receiving slide, whereas the negative film will unroll outside through an opening arranged at the base of the apparatus.

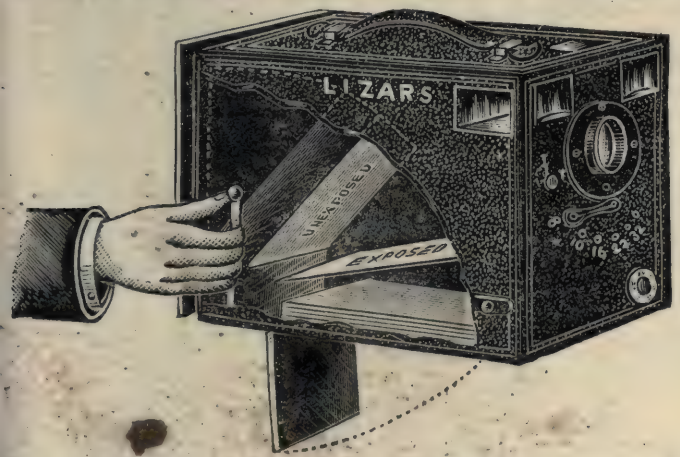
The shutter must be arranged so as to form a *complete semi circle.*

To make the exposure, close the apparatus, unscrew and remove the lens, and place before the circular opening, at a convenient distance, a light, either a gas flame or petroleum lamp. The distance which this light must be placed depends on the nature of its intensity, and the density and transparency of the negative. No precise instructions can therefore be given, but a few small strips exposed will give the necessary information to the operator. The light having been conveniently placed, all that remains is to turn the handle, the negative will fall into the basket provided under the tripod, whilst the positive will be rolled into the receiving box.

THE 'CHALLENGE' FILM MAGAZINE HAND CAMERA.

J. Lizars, 101, Buchanan-street, Glasgow.

THIS camera, which secured Mr. Lizars a medal at the recent Glasgow Exhibition, takes 50 cut films or a suitable number of plates, the use of sheaths being dispensed with. The notching of the films is also unnecessary, and, in use, the films and plates may be mixed if desired. At the back of each plate



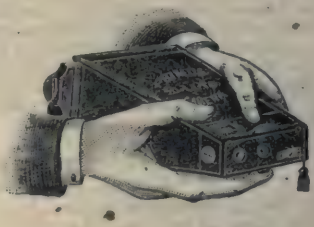
or film is placed a thin sheet of ferrotype, and, when the changing lever is pushed forward, the plate or film and the backing piece drop into the reservoir, and, by an ingenious arrangement of the changing mechanism, only one film and backing piece can be released. The changing system appears to be as certain as it is ingenious. The camera is a well-made instrument with ever set shutter working at various speeds, as well as time, brilliant finders, and exposure indicator.

THE PRIMUS 'SO-LI-TO' CAMERA.

W. Butcher & Son, Blackheath, S.E.

THIS is essentially a cyclists' and tourists' camera. A quarter-plate weighs two pounds, and it is of the field-glass pattern with mahogany body. It is covered in leather, the fittings are oxidised, and it carries a single lens with rotating stops. A time and instantaneous shutter with adjustable speeds.





Edwards's metal double dark slides, and a ground-glass view-finder are among its other features. The manner in which it is employed may be gathered from the following instructions:—Remove the dark slides from inside the body of camera, place the dark slide in position, and press the sides of the camera (which fold down) up into position, set the shutter by means of the cord, remove the shutter of dark slide, and when the picture is seen on the view-finder release the shutter.

THE PREMIER OUTFIT.

L. Gandolfi, 752, Old Kent-road, S.E.

MR. GANDOLFI has submitted to us for inspection his half-plate premier outfit, consisting of an 8½ inch rectilinear lens; camera; and double dark slide; and has shown us some excellent photographs taken with the apparatus by Mr. T. C. Sole, of Balfour, Cape Colony. The camera, which is well made of the best seasoned mahogany, has double swing back, reversing frame, rising



and falling front, double extending base with rack and pinion. A half-plate weighs 2½ lbs., and, when closed up, is only 2½ of an inch deep. It extends to 15 inches, and will allow of the use of a lens of 3½ inches focus. The lens is fixed on a revolving board. The camera as well as the book-form slide is extremely well made and finished, and the three-fold stand, which completes the set, is light, rigid, and strong.

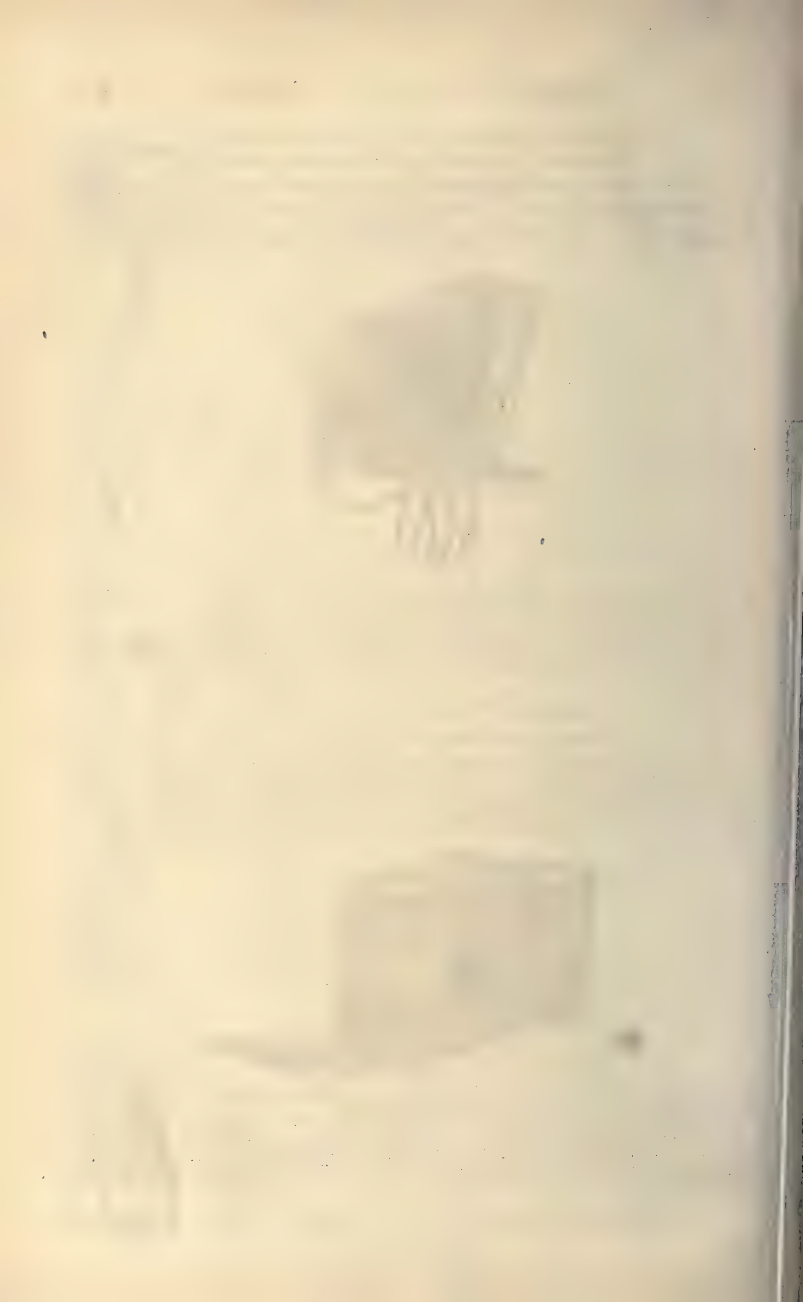
Taken with Smedley's "Up to Date" Camera and R. R. lens. Cheapest and best.



Collotype, Morgan & Kidd, Richmond.

By W. MARSHALL, Photographer, Henley-on-Thames.

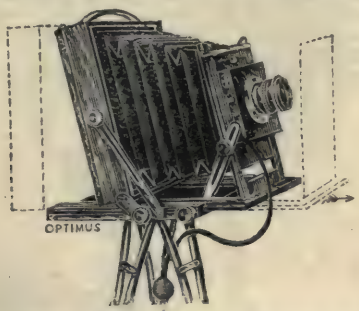
(Smedley's Blackburn.)



OPTIMUS UNIVERSAL PHOTOGRAPHIC OUTFIT.

Perken, Son, & Rayment, 99, Hatton-garden, London.

THOSE who desire an inexpensive yet efficient set of photographic apparatus may advantageously inspect one very recently put upon the market by the Optimus people. The camera is very light, and, as the diagram shows, possesses all the necessary movements demanded by the modern photographer.



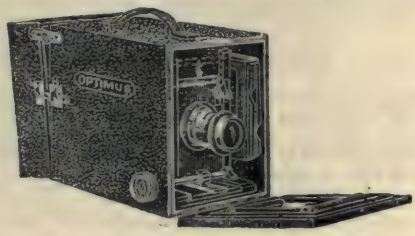
The lens is an Optimus rapid rectilinear; a roller-blind shutter is attached to it. The tripod is compact, and forms a strong and rigid support.

Messrs. Perken, Son, & Rayment further inform us that the Rayment cameras have been very considerably reduced in price this year, but that the various improvements and the high-class workmanship are maintained.

'OPTIMUS' UBIQUE HAND CAMERA.

Perken, Son, & Rayment, 99, Hatton-garden, London.

SINCE our last reference to this little nstrument, two important improvements have been added to it, viz., an arrangement for swinging the back, in either the horizontal or vertical position, and a rising and falling front. This hand camera includes rack-and-pinion adjustment (actuated from outside), and a



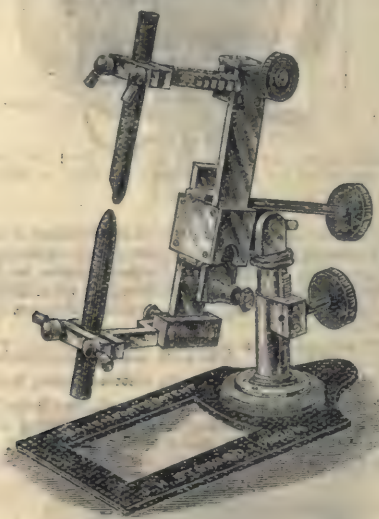
ground-glass screen for exact focussing, an Optimus rapid lens attached to a roller-blind shutter, and three double dark slides. As all are enclosed within the camera, it is self-contained. Two threaded nuts are fitted which receive screws for attachment to a tripod top. The camera being so small, it may be conveniently held in the hand for snap-shots. The external dimensions are $4\frac{1}{2} \times 5\frac{1}{2} \times 9\frac{1}{4}$.

THE DAVENPORT-STEWARD ARC LAMP.

J. H. Steward, 406, Strand, W.C.

In designing the 'Universal Arc Lamp,' the object in view has been to supply a regulator which, whilst specially adapted for ordinary lantern and cinematograph projections, should, at the same time, be provided with every form of adjustment necessary for the most delicate scientific work, such movements being placed so as to be readily accessible to the operator without requiring the lamp to be disturbed or removed from the lantern.

The above-named lamp may be used on either direct or alternating circuits



and with large or small currents giving from 500 to 5000 candle power as desired.

It is strongly made and well finished, and being constructed almost entirely of metal, will stand rough usage and great heat without risk or injury.

It is very compact, when fully extended, with carbons for two hours burning, being only 10 in. high, and the centre of illumination may be varied from 3 in. to 6 in. or more as desired.

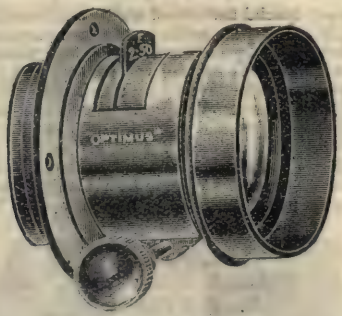
OPTIMUS OBJECTIVE FOR LANTERN PROJECTION.

Perken, Son, & Rayment, 99, Hatton-garden, London.

Messrs. Perken, Son, & Rayment, of Hatton Garden, London, are introducing a form of lens (styled the Optimus C series), which is particularly suitable for optical projection, the aperture being very large in relation to the focus; thus the No. 2 C has a diameter of 2⅝ inches, whilst the equivalent focus is 6½ inches; the No. 3 C has a diameter of 3½ inches, the focus being 8½ inches. The amount of light these lenses transmit gives a

very brilliant image on the screen, which is greatly enhanced by the crisp definition resulting from the precision of the curves of the lenses.

As these instruments possess absolute coincidence of the chemical and

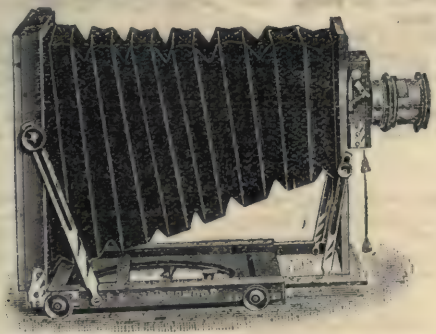


visual foci, diaphragms are supplied with them so that they may be advantageously employed for enlarging and copying, as well as for extremely rapid exposures in portraiture.

THE 'UMBRA' CAMERA.

E. & T. Underwood, 130, Granville-street, Birmingham.

THE Umbra is a new camera specially designed for the requirements of pictorial photography. In addition to all usual movements, it has a contained turntable, through which the shutter (a behind-lens one) folds when the camera is closed. The ordinary rack-and-pinion is duplicated, the second pinion being very useful with short-focus lenses, rendering unnecessary the shifting of the

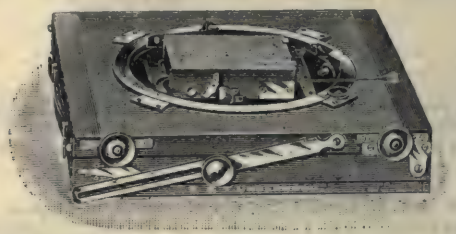


camera back. The shutter is a simple one of the roller-blind type, and is operated by the hand. By it an extra exposure to the foreground to any desired extent may be given. An equal illumination and an instantaneous exposure may also be made, at will. The front of the shutter is a detachable panel, so that various lenses may be used with it.

THE 'SALON.'

E. & T. Underwood, 130, Granville-street, Birmingham.

THIS camera has many special features of utility and convenience, the principal aim being to simplify in use the various necessary movements of the camera. The baseboard extension is by rack-and-pinion, two pinions being employed instead of the usual one. This enables the camera to be extended from the shortest to the largest possible range by racking alone without having to move either back or front of camera. The back has vertical swing, lateral swing, (very rarely used), and reversing back for placing the picture upright or horizontal as desired. This reversing back snaps into place with a spring action, which is out of sight and has no external catches or projections. The camera front is placed in position by holding it slanting backward and pressing the projections into the sockets in the baseboard. On bringing it into the



upright and tightening the side knobs it is perfectly firm and rigid. The rising front is of unusual range, and is kept in position by a novel and improved device. It is pushed up as required and stops there without any further trouble. The camera is kept closed by an improved arrangement which is entirely flush with the wood. It is operated by giving the baseboard pinion a portion of a turn.

The shutter is a new time and instantaneous one, working behind the lens. The lens is a first-class rectilinear having a set of supplementary lenses. These are each in separate cells, and fit in a slot in the diaphragm plane of the lens mount, the result being an alteration in the focus of the combination, an engraved scale being provided for each. This is a notable feature of the apparatus and will be found extremely useful in landscape work.

FORMULÆ.

WITH the view of enabling the readers of the ALMANAC to find, more readily than hitherto, any particular one of the following numerous Formulæ or Tables, we give below an Index to the Contents of this section of the ALMANAC, which will doubtless facilitate reference.

	PAGE
Albumen Paper	1025
—— Toning Baths for	1025
Ammonia Solutions, Densities of	1046
Brass-work of Lenses, To Blacken	1046
Clearing Solutions, &c.	1039
Collodio-bromide Processes	1034
—— Developers for	1035
Collodio-chloride Paper	1024
—— Toning Baths for	1024
Developing Formulæ:	
Amidol	966
Eikonogen	967
Ferrous Oxalate	963
Glycin	965
Hydroquinone	967
Metol	963
Pyro	962
Developing Formulæ of the Principal Plate and Paper Makers	969
Diaphragms, Standard	1068
Distances, Tables of, at and which Objects are in Focus	1079
Dry a Gelatine Negative Quickly, To	1043
Dry-collodion Processes	1034
Dusting-on Formulæ	1039
Emulsion Calculations, Tables for Simplification of	1048
Enlargements, Exposure for	1064
Enlargements, Tables for	1074
Equivalence of the Alkalies	1045
Exposure Table, Colonel Stuart Wortley's	1064
Exposure Table, Universal	1062
Foci, Equations relating to	1077
Gelatine Emulsion Formulæ	1037
Gelatino-chloride Paper	1022
—— Toning Baths for	1019
—— Emulsion Formulæ for	1019
Gold upon Steel, To Deposit	1060
Hypo Eliminators, &c.	1029
Illustrations for the Lantern, To Prepare	1047
Ink for Labels	1047
Intensifiers	1026
Lantern Projection, Table of Distances for	1078
Length of Studio for a given Lens	
Miscellaneous Formulæ and Recipes	1069
Objects in Motion, Table showing Displacement of on Ground Glass	1039
Oil Stains, Removal of	1071
Orthochromatic Processes	1043
Over-printed Proofs, To Reduce	1028
Ox-gall for Artistic or Scientific Purposes, To Prepare	1046
Public Buildings, Photographing in	1061
Reducers	1082
Rust from a Lens, Removing	1028
Silvering Mirrors	1043
Silver Salts, Solubility of	1039
Silver Solution, To Ascertain the Strength of a	1050
Slimy Sponges, To Clean	1055
Solubilities, Table of	1043
Standards, Photographic Society's	1056
Stops, Continental, and their U.S. Equivalents	1072
Sun's Position, Table showing Variation of	1070
Symbols, Tables of Chemical	1060
Table of Distances	1051
Thermometric Tables	1080
'U.S.' System of Numbering Stops	1059
Varnishes	1067
View Angles	1031
View Angles, Table of	1076
Wet-collodion Process	1075
—— Developers	1032

DEVELOPING FORMULÆ FOR GELATINE DRY PLATES, ETC.

THE following are a few of the typical formulæ that are generally employed for development, &c.; a much greater variety will be found in the section headed 'Developing Formulæ of the Principal Plate-makers' (p, 903), to which we also refer the reader.

PYRO SODA.

No. 1. A. Sulphite of soda ..... 6 ounces.
Water ..... 32 „
Pyrogallic acid ..... 1 ounce.

(Having dissolved the sulphite of soda, add sufficient citric acid in solution to cause a piece of blue litmus paper inserted therein to become reddened.)

B. Carbonate of soda ..... 3 ounces.
Carbonate of potash ..... 1 ounce.
Water ..... 32 ounces.

When about to develop, mix these in equal proportions with two parts the bulk of water, or, if the weather be *very* hot at the time, even a greater proportion of water.

No. 2. A. Sulphite of soda (crystals) ..... 2 ounces.
Citric acid ..... 60 grains.
Ammonium bromide ..... 40 „
Pyro ..... 1 ounce.
Water ..... 12 ounces.

B. Sulphite of soda (crystals) ..... 2 ounces.
Carbonate potassium (crystals) ..... 3 „
Water ..... 12 „

To develop, use 1 drachm of each to 2 ounces of water.

WELLINGTON & WARD,

ELSTREE, HERTS,

Manufacturers of { Platino-Matt Bromide, Sylvio P.O.P., &c., &c.

PYRO AND AMMONIA.

No. 1.	Strong liquid ammonia	2 ounces.
	Bromide potassium	300 grains.
	Water	80 ounces.
No. 2.	Pyrogallic Acid	20 grains.
	Water	10 ounces.
	Nitric acid	2 drops.

For use take equal parts.

FERROUS OXALATE.

No. 1.	Saturated solution of sulphate of iron	1 part.
	Saturated solution of oxalate of potash	3 parts.

Mix *quant. suff.* by pouring the iron into the oxalate. In hot weather the proportion of the iron solution may be diminished with advantage.

FOR TRANSPARENCIES ON GELATINO-CHLORIDE PLATES.

No. 2.	A. Neutral oxalate of potash	2 ounces.
	Chloride of ammonium	40 grains.
	Distilled water	20 ounces.
	B. Sulphate of iron	4 drachms.
	Citric acid	2 ,,
	Alum	2 ,,
	Distilled water	16 ounces.

For black tones mix the above in equal volumes.

METOL.

SINGLE-SOLUTION DEVELOPER.

Metol	40 grains.
Sulphite of soda	120 ,,
Hydroquinone	48 ,,
Carbonate of potash	240 ,,
Water	8 ounces.

Apply heat if necessary to dissolve the metol, and afterwards add the sulphite, and allow that to dissolve before adding the other ingredients.

For use under normal conditions, one part of the above is to be diluted with three parts of water.

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TWO-SOLUTION DEVELOPER.

A.	Metol	40 grains.
	Hydroquinone	48 ,,
	Sulphite of soda	120 ,,
	Water	8 ounces.
B.	Carbonate of potash	1 ounce.
	Water	1 quart.

For use, mix one part of A with three parts of B for ordinary exposures; for over-exposures use less of B, or else add a few drops of a ten per cent. solution of bromide of potassium, or of a five per cent. solution of citric acid; for slight under-exposure, increase B.

THREE-SOLUTION DEVELOPER.

A.	Metol	40 grains.
	Sulphite of soda	120 ,,
	Water	8 ounces.
B.	Hydroquinone	40 grains.
	Citric acid	10 ,,
	Water	8 ounces.
C.	Carbonate of potash	1 ounce.
	Water	20 ounces.

For use under similar conditions to those already mentioned, take one part each of A and B and two parts of C.

METOL-HAUFF.

Solution A.

Water	100 parts.
Metol	1 part.
Soda sulphite	10 parts.

Solution B.

Water	100 parts.
Carbonate potash (or substitute)	10 ,,
Crystallised carbonate soda	20 ,,

For use, three parts A to one of B, with 40 minims of bromide of potassium solution (1 : 10).

THE WELLINGTON

Platino-Matt Bromide

For Portraiture (See Frontispiece)

METOL-ANDRESEN.

Water	1	quart.
Metol	¾	ounce.
Sulphite of soda	7	ounces.
Carbonate of potash	3½	,,
Bromide of potassium	⅒	ounce.

To photographers who prefer to work with separate solutions the following is recommended:—

A. Water	1	quart.
Metol	¾	ounce.
Sulphite of soda	7	ounces.
B. Water	3	quarts.
Carbonate of soda	7	ounces.

Of these one part of A is mixed with three parts of water for use, bromide of potassium being added as required for the prevention of fogging.

ANDRESEN'S GLYCIN.

I. For soft development:

Solution A (warm slightly).

Glycin	4	parts.
Carbonate of potash	1½	,,
Sulphite of soda (cryst.)	12	,,
Water	100	,,

Solution B.

Carbonate of potash	10	,,
Water	100	,,

For use mix one part of *A* with two parts of *B*.

II. For hard development:

Glycin	5	parts.
Carbonate of potash	25	,,
Sulphite of soda (cryst.)	25	,,
Water	100	,,

For use to be diluted three times its volume.

THE WELLINGTON

Platino-Matt Bromide

For Enlargements.

GLYCIN-HAUFF.

The concentrated developer is made up as follows:—350 grains of sodium sulphite crystal are dissolved in one ounce of water, 150 grains of glycin are then added and heated to boiling point, and one and a half ounces of potash carbonate are added (begin adding the potash in small quantities, on account of the carbonic acid gas). When cold, this concentrated developer—forming a thin, pasty solution—may be kept as stock. For use, shake the solution first, and dilute the required quantity twelve times for ordinary purposes. For use when development is to be left to itself the stock solution is diluted fifty times.

A One-solution Formula.

Sodium sulphite	40 grains.
Glycin	20 ,,
Potassium carbonate	80 ,,
Water	4 ounces.

PARA-AMIDOPHENOL.

Para-amidophenol chlorhydrate	5 grammes.
Crystallised carbonate of sodium	50 ,,
Crystallised sulphite of sodium	50 ,,
Water	1000 ,,

For use, dilute with an equal bulk of water.

Para-amidophenol hydrochlorate	60 grains.
Sodium sulphite	60 ,,
,, carbonate	400 ,,
Water	20 ounces.

Dr. Andresen's Formula.

Para-amidophenol chlorhydrate	8 parts.
Sodium sulphite	80 ,,
,, carbonate	40 ,,
Water	1000 ,,

AMIDOL.

Amidol	80 grains.
Sodium sulphite	800 ,,
Water	8 ounces.

THE WELLINGTON

Platino-Matt Bromide.

Smooth, Rough, Tinted Rough, &c.

For use, one ounce of the solution is diluted with three ounces of water, with one and a half grains of potassium bromide to the ounce of developer.

EIKONOGEN.

No. 1.	A.	Crystalline sulphite of soda	40 grammes.
		Eikonogen	3 ,,
		Distilled water	500 c.cm.
	B.	Carbonate of potash (or calcined soda)	60 to 75 grammes.
		Distilled water	500 c.cm.

For use, mix equal volumes of A and B.

One-Solution Developer.

Sulphite of soda in crystals	8 ounces.
Carbonate of soda in crystals	3 ,,
Distilled water	80 ,,
Eikonogen	1 ounce.

HYDROQUINONE.

No. 1.		Hydroquinone	1 part.
		Sulphite of soda	2 parts.
		Carbonate of soda	10 ,,
		Water	67 ,,
No. 2.	A.	Hydroquinone	4 grains.
		Metabisulphite of potash	4 ,,
		Bromide of potassium	1 grain.
		Distilled water	1 ounce.
	B.	Potassium hydrate	10 grains.
		Distilled water	1 ounce.

Equal parts of A and B.

With some plates the bromide may be omitted.

No. 3.	A.	Hydroquinone	80 grains.
		Citric acid	10 ,,
		Sulphite of soda (recrystallised)	80 ,,
		Distilled water	20 ounces.
	B.	Caustic potash (fused)	160 grains.
		Sulphite of soda	160 ,,
		Distilled water	20 ounces.

The WELLINGTON

SYLVIO P.O.P.

Pink, Mauve, White, and Matt.

C. Bromide of potassium ..... 24 grains.
Distilled water ..... 1 ounce.

D. Caustic potash ..... 160 grains.
Distilled water ..... 20 ounces.

For normal exposures use equal parts of A and B, adding five minims of C for every ounce of solution.

For over-exposed plates use D instead of B, with an extra quantity of C.

For under-exposed plates omit C, and in extreme cases add six or eight grains more of sulphite of soda to each ounce of the developer. The object of increasing or decreasing the quantity of sulphite is to give greater or lesser density.

No. 4. A. Hydroquinone ..... 160 grains.
Sulphite of soda ..... 2 ounces.
Citric acid ..... 60 grains.
Bromide of ammonium ..... 20 ,,
Water to ..... 20 ounces.

B. Carbonate of potash ..... 2 ounces.
Carbonate of soda (crystal) ..... 2 ,,
Water to ..... 20 ,,

Take equal parts.

No. 5. A. Hydroquinone ..... 15 grains.
Sulphite of soda ..... 75 ,,
Water ..... 5 ounces.

B. Carbonate of potash ..... 90 grains.
Water ..... 5 ounces.

C. Ten per cent. solution of bromide of potassium.

Use equal parts of A and B, and add two or three minims of C. With some plates no bromide restrainer will be required.

No. 6. Sulphite of soda ..... 40 grammes.
Hydroquinone ..... 5 ,,
Carbonate of soda ..... 75 ,,
Water ..... 200 c.c.

For use, dilute ten c.c. with water to thirty-five c.c.

For a single stock solution prepare as follows :—

No. 7. A. Hydroquinone ..... 50 grains.
Metabisulphite of potash ..... 80 ,,
Water ..... 4 ounces.

The WELLINGTON

SYLVIO P.O.P.

Gives a *SUPERB* variety of Tones.

B. Carbonate of potash ..... 840 grains.
Water ..... 4 ounces.

Filter solution B, and then mix A and B.

For use, take half an ounce of this solution and add to five ounces of water.

FOR CHLORIDE PLATES.

Hydroquinone ..... 2 grains.
Sulphite of soda ..... 10 ,,
Carbonate of ammonia (or pot.) ..... 10 ,,
Bromide of potassium ..... $\frac{1}{10}$ grain.
Water ..... 1 ounce.

DEVELOPING FORMULÆ, ETC., OF THE PRINCIPAL PLATE-MAKERS.

AUSTIN EDWARDS'S FORMULÆ.

PYRO.

No. 1. Pyrogallic acid ..... 1 ounce.
Nitric acid ..... 20 drops.
Water ..... 80 ounces.

No. 2. Sulphite of soda ..... 10 ounces.
Carbonate of soda (crystals) ..... 9 ,,
Water ..... 80 ,,

Add the acid to the water before dissolving the pyro.

For correct exposure, use equal parts of Nos. 1 and 2.
For under-exposure, use more No. 2.
For over-exposure use more No. 1, or add a few drops of per ounce 10 per cent. bromide potassium solution.
For correct exposure, no bromide is necessary.

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SYLVIO P.O.P.
For Professional & Amateur Photographers.

Hydroquinone.

No. 1.	Water	20 ounces.
	Hydroquinone	120 grains.
	Sulphite soda	2 ounces.
No. 2.	Water	20 ounces.
	Carbonate of potash	4 ,,
	Bromide potassium	30 grains.

Dissolve the hydroquinone in the water before adding the sulphite. For use take equal parts of each.

Hydroquinone Developer for Lantern Plates.

(For Black Tones.)

Distilled water	20 ounces.
Hydroquinone	60 grains.
Sulphite soda	2 ounces.
Carbonate soda (crystals)	6 ,,
Bromide potassium	40 grains.

Dissolve the hydroquinone in the water and add the other ingredients in the order named.

Time of development, if exposed correctly, about 2 minutes. This developer may be used several times.

Pyro Developer.

(For Warm Tones.)

No. 1.	Water	20 ounces.
	Nitric acid	20 drops.
	Sulphite soda	4 ounces.
	Pyrogallic acid	1 ounce.
No. 2.	Water	20 ounces.
	Bromide ammonium (not potassium)	3 ,,
	Liq. ammonia ·880	1 ounce.

Add the acid to the water, and the other ingredients in the order named.

For use, take 1 part each of Nos. 1 and 2, and dilute with equal quantities of water. For still warmer tones, add 1 part more water, or again double the exposure and add one fourth more No. 2. This developer may be used several times.

The WELLINGTON

ENAMMO Glazed Surface Bromide.

ROSE TINT and WHITE.

CADETT & NEALL'S FORMULÆ.

Pyro Ammonia (1).

Stock Solution.

Pyrogallic acid ..... (avoirdupois) 1 ounce.
Ammonium bromide ..... ,, ½ ,,
Potass. metabisulphite ..... ,, 1 ,,
Distilled water to make altogether, 7 ounces, 3 drachms, fluid.

Dissolve the metabisulphite and bromide in part of the distilled water before adding the pyrogallic acid.

A. Stock solution ..... 1 ounce.
Distilled water to make altogether ..... 20 ounces=1 pint.

B. Ammonia (·890) ..... 2½ drachms.
Distilled water to make altogether ..... 20 ounces=1 pint.
Mix equal parts of A and B to make developer.

Pyro-Ammonia (2).

Stock Solution.

Pyrogallic acid ..... (avoirdupois) 1 ounce.
Ammonium bromide ..... ,, 1 ,,
Sulphurous or sulphuric or citric acid ..... 1 drachm.
Distilled water to make altogether, 7 ounces, 3 drachms, fluid.

Mix the acid with part of the distilled water before adding the bromide and pyrogallic acid.

A. Stock solution ..... 1 ounce.
Distilled water to make altogether ..... 20 ounces=1 pint.

B. Liq. ammoniæ (·890) ..... 2½ drachms.
Distilled water to make altogether ..... 20 ounces=1 pint.
Mix equal parts of A and B to make developer.

Ferrous Oxalate.

A. Ferrous sulphate ..... (avoirdupois) 5 ounces.
Sulphuric acid..... 10 minims.
Distilled water to make altogether (avoirdupois) 20 ounces.

B. Neutral potass. oxalate ..... (avoirdupois) 10 ounces.
Distilled water to make altogether ..... (fluid) 40 ,,

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ENAMMO Glazed Surface Bromide.
For Contact or Enlargements.

Dissolve the potass. oxalate in about three-quarters of the distilled water, made warm, and make up to bulk after the salt is dissolved.

The ferrous sulphate should be powdered just before solution in about three-quarters of the distilled water to which the sulphuric acid has been previously added. Make up to bulk after solution.

To make developer, add one part of A to four of B. For over-exposure, add a few drops to the mixed developer of a ten per cent. solution of potassium bromide.

Pyro Soda.

Stock Solution.

Pyrogallic acid	(avoirdupois)	1 ounce.
Potassium metabisulphite		40 grains.
or sulphuric acid	(fluid)	1 drachm.
Distilled water to make altogether	,,	10 ounces.
A. Stock solution	(fluid)	3 ounces.
Distilled water to make altogether	,,	20 ,,
B. Sodium carbonate (crystals)	(avoirdupois)	11 ounces.
or ditto ditto (anhydrous)	,,	4 ,,
Sodium sulphite (recrystd.)	,,	15 ,,
Distilled water to make altogether	,,	80 ,,

Equal parts of each to make developer.

A few drops of a ten per cent. solution of potassium bromide may be added to the developer when necessary. In very hot weather the hypo bath should not be stronger than 1lb. of sodium hyposulphite to 2 quarts of water.

Developers for the 'Cadett' Lantern Plates.

Warm Tones.—Pyro Ammonia.

A. Pyrogallic acid		40 grains.
Ammonium bromide		40 ,,
Potass metabisulphite		120 ,,
Distilled water to make altogether	(fluid)	20 ounces.
B. Liq. ammoniæ		150 minims.
Distilled water to make altogether	(fluid)	20 ounces.

Equal parts of A and B to make developer.

This formula gives rich warm tones with suitable exposure.

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Specially recommended FOR EXPORT.

For warm black tones, the following may be used :—

A.	Pyrogallic acid	30 grains.
	Sodium sulphite	100 ,,
	Sulphurous acid (or citric acid 5 grains)	5 minims.
	Ammonium bromide	30 grains.
	Distilled water to make altogether	20 ounces.
B.	Liq. ammoniæ ·890	40 minims.
	Distilled water to make altogether (fluid)	20 ounces.

Equal parts A and B to make developer.

A rich warm black can be obtained with hydroquinone, and we strongly recommend the following formula :—

A.	Hydroquinone	70 grains.
	Potass metabisulphite	10 ,,
	or sulphurous acid	15 minims.
	Potassium bromide	35 grains.
	Distilled water to make altogether (fluid)	20 ounces.
B.	Potassium hydrate (sticks)	140 grains.
	Sodium sulphite	700 ,,
	Distilled water to make altogether	20 ounces.

Equal parts A and B to make developer.

Black Tones.

Cold, but brilliant black tones are obtained with ferrous oxalate, adding a sufficient quantity of a 10 per cent. solution of potassium bromide to prevent too rapid development.

A.	Ferrous sulphate (avoirdupois)	5 ounces.
	Sulphuric acid	10 minims.
	Distilled water to make altogether (avoirdupois)	20 ounces.
B.	Neutral potass oxalate (avoirdupois)	10 ounces.
	Distilled water to make altogether (fluid)	40 ,,

Dissolve the potass oxalate in about ¾ of the distilled water, made warm, and make up to bulk after the salt is dissolved.

The ferrous sulphate should be powdered just before solution in about ¾ of the distilled water to which the sulphuric acid has been previously added. Make up to bulk after solution.

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Is a Guarantee of the

HIGHEST QUALITY.

To make developer, add 1 part of A to 4 of B. For over-exposure add a few drops to the mixed developer of a 10 per cent. solution of potassium bromide.

EASTMAN COMPANY'S FORMULÆ.

For Bromide Paper.

No. 1.	Oxalate of potash	16 ounces.
	Hot water	48 ,,
No. 2.	Proto-sulphate of iron	16 ounces.
	Hot water	32 ,,
	Acetic acid (or citric acid, ½ ounce)	½ drachm.
No. 3.	Bromide of potassium	1 drachm.
	Water	10 ounces.

These solutions must be cooled and kept separately, and should be mixed only for immediate use.

To develop, take in a suitable tray, No. 1, six ounces; No. 2, one ounce; No. 3, half drachm. Mix in the order given; use cold. After exposure, soak the paper in water until limp; then immerse in the developer. The image should appear slowly, and should develop up strong, clear, and brilliant. When the shadows are sufficiently black, pour off the developer and flood the plate with the

Clearing Solution.

Acetic acid	1 drachm.
Water	32 ounces.

After fixing, wash thoroughly two hours, and hang up to dry. Use fresh developer for each batch of prints. With a glass-bottomed tray eight ounces of developer are sufficient for a 25 × 30 print.

For Kodak Films.

No. 1.	Sulphite of soda	6 ounces.
	Hot water	32 ,,
	When cold, add—	
	Pyrogallic acid	1 ounce.

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No. 2.	Carbonate of soda	8 ounces.
	Carbonate of potash	1 ounce.
	Water	32 ounces.

To develop, take, for normal exposures, one part each of No. 1 and No. 2, together with two parts of water.

Restrainer.

Bromide of potassium	1 ounce.
Water	6 ounces.

If a number of films are fixed together in one tray, they should be put in *face down*, to avoid abrasion of the sensitive surface. It is well to move them about in the fixing bath, from time to time, in order to remove any air bubbles. After fixing, *wash thoroughly;* then immerse for one minute in the

Soaking Solution.

Water	16 ounces.
Glycerine	½ ounce.

Remove from the soaking solution, and pin up each film by *one* of its corners, to dry spontaneously. Any tear drops of the soaking solution should be removed with a bit of blotting-paper or absorbent cotton.

EDWARDS'S FORMULÆ.

PYRO AND AMMONIA DEVELOPER.

No. 1.	Pyrogallic acid	1 ounce or 30 grammes.
	Citric acid	40 grains or 3 ,,
	Water	7½ ounces or 214 c. c.
No. 2.	Strong ammonia ·880	1 ounce or 28 c. c.
	Bromide of potassium	120 grains or 8 grammes.
	Distilled water	7 ounces or 200 c. c.

The above will keep good for months, if well corked.

For use, dilute 1 part No. 1 with 19 parts of water, and in another

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bottle 1 part No. 2 with 19 parts of water. The dilute solutions should be made fresh every day.

To develop a correctly exposed plate or film mix equal parts of these two solutions.

PYRO AND SODA DEVELOPER.

No. 1.	Pyrogallic acid	1 ounce or 30 grammes.
	Nitric acid	20 drops or 1 c. c.
	Water	80 ounces or 2 litres 300 c. c.
No. 2.	Sulphite of soda	10 ounces or 300 grammes.
	Carbonate of soda (washing soda)	8 ounces or 226 grammes.
	Water	80 „ „ 2 litres 300 c. c.
No. 3.	Bromide of potassium	1 ounce or 30 grammes.
	Water	9 ounces or 250 c. c.

To develop, mix equal parts of Nos. 1 and 2, and add 10 minims of No. 3 to each ounce of the mixed developer, or, instead, 3 ounces of No. 3 may be added to the 80 ounces of No. 2. For rapid shutter exposures, omit the bromide.

PYRO AND SODA DEVELOPER WITH METABISULPHITE.

No. 1.	Pyrogallic acid	1 ounce or 30 grammes.
	Metabisulphite of soda (Boake's)	1 „ „ 30 „
	Water	80 ounces or 2 litres 300 c. c.

Dissolve the metabisulphite, and then add the pyro.

No. 2.	Carbonate of soda (washing soda)	12 ounces or 360 grammes.
	Sulphite of soda	4 „ „ 120 „
	Water	80 „ „ 2 litres 300 c. c.
No. 3.	Bromide of potassium	1 ounce or 30 grammes.
	Water	9 ounces or 250 c. c.

To develop, mix equal parts of Nos. 1 and 2. When working in the summer time in a good light, with full exposure, add 5 minims of No. 3 to each ounce of developer (or to save the trouble of measuring small quantities, 1½ ounces of No. 3 may be added to the 80 ounces of No. 2). In winter the bromide may generally be omitted, and also for rapid shutter exposures, and portrait work in the studio.

THE WELLINGTON

Platino-Matt Bromide

For Portraiture (See Frontispiece)

Hydroquinone Developer.

No. 1. Hydroquinone	¼ ounce or	7 grammes.
Sulphite of soda	1 „ „	30 „
Bromide of potassium	7 grains or	½ gramme.
Distilled boiling water to make	12 ounces or	340 c. c.
No. 2. Carbonate of potash	½ ounce or	15 grammes.
Distilled water to make	12 ounces or	340 c. c.

First dissolve the hydroquinone, and then add the sulphite and bromide.

For use mix equal parts of Nos. 1 and 2.

In case of slight over-exposure add a few drops or minims of a 10 per cent. solution of bromide of potassium to each ounce of developer, more or less according to the extent of over-exposure. For considerable over-exposure use the redeveloper.

For under-exposure, pour off the hydroquinone developer and finish development with the eikonogen developer given below.

Eikonogen Developer.

Eikonogen	½ ounce or	14 grammes.
Carbonate of potash	1 „ „	30 „
Sulphite of soda	2 ounces or	60 „
Distilled boiling water	20 „ „	600 c. c.

First dissolve the eikonogen, then the sulphite, and lastly the carbonate of potash.

Instead of mixing the developers, the development may be commenced with eikonogen, and when the detail is sufficiently out, hydroquinone substituted for it, without waiting to wash the negative, and the development finished with this, or in case of much over-exposure with the following hydroquinone redeveloper:—

Hydroquinone Redeveloper.

No. 1. Hydroquinone	¼ ounce or	7 grammes.
Sulphite of soda	2 ounces or	60 „
Bromide of potassium	¼ ounce or	7 „
Distilled boiling water to make	12 ounces or	340 c. c.

THE WELLINGTON

Platino-Matt Bromide

For Enlargements.

No. 2. Carbonate of soda (washing soda)	2 ounces	or 60 grammes.
Sulphite of soda	2 ,,	,, 60 ,,
Distilled water to make	12 ,,	,, 340 c. c.

For use mix equal parts of Nos. 1 and 2.

Edwards's Gelatino-chloride Plates.

Development.

Make two stock solutions as follows:—

No. 1. Neutral oxalate of potash	2	ounces.
Chloride of ammonium	40	grains.
Distilled water	20	ounces.
No. 2. Sulphate of iron	4	drachms.
Citric acid	2	,,
Alum	2	,,
Distilled water	20	ounces.

The above solutions will keep indefinitely.

When required for use, mix equal portions of the above solutions, adding No. 2 to No. 1, to form the developer.

Edwards's Special Transparency Plates.

Pyro and Ammonia Developer.

For Warm Tones.

No. 1. Pyrogallic acid	1	ounce or 30 grammes.
Sulphite of soda	4	ounces or 120 ,,
Citric acid	¼	ounce or 8 ,,
Water to make	16	ounces or 460 c. c.

First dissolve the sulphite and citric acid, and then add the pyrogallic.

No. 2. Bromide of ammonium	1	ounce or 30 grammes.
Liq. ammoniæ ·880	5½	drachms or 20 c. c.
Water to make	16	ounces or 460 c. c.

For use, mix 1 part of No. 1 and 3 parts of No. 2, and dilute with water to double the quantity.

THE WELLINGTON

Platino-Matt Bromide.

Smooth, Rough, Tinted Rough, &c.

Hydroquinone Developer.

For Black Tones.

Hydroquinone	60 grains	or	3 grammes.
Sulphite of soda	2 ounces	or	45 ,,
Carbonate of soda (crystals)	4 ,,	,,	90 ,,
Carbonate of potash	2 ,,	,,	45 ,,
Bromide of potassium	40 grains	or	2 ,,
Hot distilled water	20 ounces	or	450 c. c.

For black and white line subjects add 1 drachm of a 60-grain solution bromide of potassium to each ounce of developer.

Dissolve the hydroquinone in the water, and add the other ingredients in the order named.

Amidol Developer.

For Black Tones.

Amidol	80 grains	or	5 grammes.
Soda sulphite	2 ounces	or	60 ,,
Bromide of potassium	½ ounce	or	15 ,,
Water	12 ounces	or	360 c. c.

ELLIOTT & SONS' FORMULÆ.

The 'Barnet' Plates, Ordinary.

No. 1.	Ammonia (·880)	1½ ounce.
	Water	20 ounces.
No. 2.	Pyrogallic acid	160 grains.
	Bromide of ammonium	¾ ounce.
	Water	20 ounces.
	Pure nitric acid	10 drops.

For use, mix ½ an ounce of No. 1, ½ an ounce of No, 2 with 3 ounces of water.

Pyro and Ammonia (ten per cent. Solutions).

No. 1.	Ammonia (·880)	1 ounce.
	Water	9 ounces.

The WELLINGTON

SYLVIO P.O.P.

Pink, Mauve, White, and Matt.

No. 2.	Bromide of ammonium	1 ounce.
	Water, to make	10 ounces.
No. 3.	Pyro	1 ounce.
	Water, to make	10 ounces.
	Nitric acid, pure	20 drops.

For studio use, take 80 minims No. 1, 40 minims No. 2, 20 minims No. 3, and make up to 2 ounces with water.

The above developer is the same strength as that recommended on the boxes.

For outdoor work, take 80 minims No. 1, 60 minims No. 2, 40 minims No. 3, and make up to 2 ounces with water.

Pyro and Soda Developer.

Solution No. 1.

Pyro	1 ounce.
Water	86 ounces.
Nitric acid, pure	20 drops.

Solution No. 2.

Pure sulphite soda	10 ounces.
Pure carbonate soda (crystals)	9 "
Water	86 "

Use equal parts of No. 1 and 2, and dilute with equal bulk of water. To each ounce add 1 or 2 drops of a ten per cent. solution of bromide of potassium.

'BARNET' LANTERN TRANSPARENCY PLATES.

For Cold or Warm Tones (according to exposure and development).

INSTRUCTIONS FOR USE.

Contact Printing.—For black tones the exposure required is about 10 seconds at a distance of 1 foot from an ordinary gas flame: the developer to be used is either No. 1 or 2.

To secure warm tones it is necessary to increase the exposure to 2 or 3 minutes and use formula either No. 3 or 4.

To obtain still warmer (reddish) tones, increase the exposure still further to 5 or 6 minutes and develop with formula No 5.

Reductions in the Camera.—For black tones with stop *f*-16 in bright

The WELLINGTON

SYLVIO P.O.P.

Gives a *SUPERB* variety of Tones.

diffused light from a half-plate negative an exposure of about 10 seconds is required, using formula No 1 or 2 for developing.

For warm tones increase the exposure to 2 or 3 minutes and using for developer either formula No. 3 or 4.

For still warmer tones further increase the exposure to 5 or 6 minutes and develop with formula No. 5.

Formulæ for Developers.

Note.—In cold weather all solutions should be raised to a temperature of 60°.

Cold Black Tones.

A.

No. 1.	Metol	400 grains.
	Soda sulphite	8 ounces.
	Water	80 ,,

B.

	Carbonate of potash	1200 grains.
	Ammonium bromide	240 ,,
	Potassium bromide	480 ,,
	Water	80 ounces.

Take equal parts of A and B.

Note.—The ammonium bromide is necessary for the production of absolutely cold black tones; a larger quantity is not recommended, as it tends to produce a slight veil in the high lights.

Length of time in developing about 2 minutes.

Warm Black Tones.

A.

No. 2.	Hydroquinone	640 grains.
	Soda sulphite	8 ounces.
	Potass bromide	120 grains.
	Water	80 ounces.

The WELLINGTON

SYLVIO P.O.P.

For Professional & Amateur Photographers.

B.

Sodium hydrate	640 grains.
Water	80 ounces.

Take equal parts of A and B.

This produces a very pleasing warm black. Length of time in developing about 2 minutes.

Warm Brown Tones.

A.

No. 3. Pyro	1 ounce.
Soda sulphite	4 ounces.
Water	80 ,,

B.

Carbonate of ammonia	900 grains.
Potassium hydrate	750 ,,
Ammonium bromide	600 ,,
Water	80 ounces.

Take equal parts of A and B.

Length of time in developing about 2 minutes.

Or the following may be used:—

No. 4.—Take equal parts of No. 2 formula and add to each ounce 3 grains carbonate of ammonia and 3 grains of ammonium bromide.

Length of time in developing about 3 or 4 minutes.

Very Warm (Reddish) Tones.

No. 5.—Take equal parts of No. 2 formula and add to each ounce 6 grains of carbonate of ammonia and 6 grains ammonium bromide.

Length of time in developing about 8 minutes.

Fixing Bath.

We recommend the bath not to be made stronger than

Hypo	5 ounces.
Water	20 ,,

Clearing solutions will not be found necessary with these plates.

The WELLINGTON

ENAMMO Glazed Surface Bromide.

ROSE TINT and WHITE.

Barnet Bromide Paper.

(Extra Rapid)

Platino Matt Surface.—Directions for Working.

Exposure.—For contact work from an average negative about 4 seconds, 18 inches from an ordinary gas burner.

For enlarging it is impossible to give any fixed data, so much depending upon the source of light. It is recommended to make a trial exposure upon a small piece of paper.

After exposure place the print, sensitive side upwards, in a clean developing dish, flood with water for a few seconds, drain off water, and then with one sweep cause the developer to flow evenly and quickly over the whole surface of the print.

Developers.—Ferrous-oxalate.

A.	Oxalate of potash	1 pound.
	Bromide potass	5 grains.
	Hot water	48 ounces.
B.	Sulphate of iron	1 pound.
	Citric acid	½ ounce.
	Hot water	32 ounces.

Take 6 ounces of A and 1 ounce of B.

Immediately after developing, the print must be transferred straight into the acid bath.

	Acetic acid	1 drachm.
	Water	32 ounces.

We strongly recommend the following

Metol Developer.

A.	Metol	400 grains.
	Sodium sulphite	8 ounces.
	Potass bromide	50 grains.
	Water	80 ounces.
B.	Potass carbonate	8 ounces.
	Water	80 ,,

Take 3 ounces of A and 1 ounce of B.

The WELLINGTON

ENAMMO Glazed Surface Bromide.

For Contact or Enlargements.

The image should appear in a few seconds, and development will be complete in about 2 minutes. Rinse in 3 changes of water and fix in fixing bath as above (no acid bath is necessary with this developer).

To produce softer results, either of the above may be diluted with an equal quantity of water.

After fixing, wash thoroughly in several changes of water for at least 2 hours, squeegee off the superfluous moisture, and hang up to dry.

GEM DRY PLATE COMPANY'S FORMULÆ.

Developer for Plates and Films.

No. 1.	Pyrogallic acid	1 ounce.
	Potassium bromide	60 grains.
	Sulphite of soda	6 ounces.
	Water to	50 „
No. 2.	Washing soda	6 ounces.
	Water to	50 „

For use, take equal quantities of No. 1 and No. 2.
For known under-exposure use an increased proportion of No. 2.
For known over-exposure use larger quantity of No. 1.

Alum Bath.

Alum	1 ounce.
Water	20 ounces.

Wash before and after immersing in the alum bath.

Fixing Solution.

Hypo	1 pound.
Water	64 ounces.

— THE —

WELLINGTON Photographic PAPERS

Specially recommended FOR EXPORT.

LANTERN PLATES.

Developer for Cold or Warm Tones.

Cold Tones.

Hydroquinone.

A.	Hydroquinone	½ ounce.
	Citric acid	½ ,,
	Potassium bromide	60 grains.
	Water	20 ounces.
B.	Caustic soda	½ ounce.
	Sodium sulphite	3 ounces.
	Water	20 ,,

For use, take equal parts of A and B, and dilute with water equal to their combined bulk.

Warm Tones.

C.	Ammonium carbonate	1 ounce.
	Ammonium bromide	1 ,,
	Water	20 ounces.

For use, take of the above hydroquinone formula 2 parts, and add 1 part of C.

In obtaining either cold or warm tones, it is well to remember that exposure is the greatest factor. For cold tones, an exposure of 10 to 20 seconds, 1 foot from a No. 5 gas burner, will be ample, and develop as above. For warm and deeply coloured tones, expose from 30 seconds to 3 minutes, and develop with addition of C, always using a slightly increased proportion of C as the exposure is prolonged.

THE ILFORD FORMULÆ.

STOCK SOLUTION OF PYRO.

Water	5½ ounces.
Nitric acid	20 minims.
Pyrogallic acid	1 ounce.

The WELLINGTON BRAND

Is a Guarantee of the

HIGHEST QUALITY.

Add the acid to the water *before* the pyro, and the solution will then keep good for several months.

For Soft Negatives.

No. 1.	Stock solution	1 ounce.
	Water to make up to	20 ounces.

For Dense Negatives.

	Stock solution	2 ounces.
	Water to make up to	20 ,,
No. 2.	Carbonate of soda, crystals (not bicarbonate) (avoirdupois)	2 ounces.
	Sulphite of soda ,,	2 ,,
	Bromide of potassium	20 grains.
	Water to make up to	20 ounces.

For normal exposures take equal quantities of Nos. 1 and 2.

Alum Bath.—After developing, wash the plate well under the tap, and immerse for a few minutes in

Alum	8 ounces.
Water	20 ,,

Never omit the alum bath, and do not be tempted to add any other chemical either to that or to the fixing bath.

ILFORD BROMIDE PAPER AND OPALS.

Development.—Make the following solutions and use when cold :—

No. 1.	Neutral oxalate potash (avoirdupois)	1 pound.
	Warm water	64 ounces.
	Bromide ammonium	20 grains.
	Filter.	
No. 2.	Sulphate iron (avoirdupois)	1 pound.
	Warm water	48 ounces.
	Sulphuric acid	1 drachm.
	Filter.	

For use, add 1 ounce No. 2 to 6 ounces No. 1, not *vice versâ*. As for Alpha, old developer gives brilliancy, especially in cases of over-exposure or weak negatives. Development is complete when image appears fully out. After development and without washing, immerse the prints for about 2 minutes in clearing solution, pour off and repeat.

Clearing Solution.

Water	80 ounces.
Sulphuric acid	½ ounce.

Then wash thoroughly for about 10 minutes in several changes of water. All the acid must be removed, or fading of prints will result.

After fixing, wash for 2 hours in running water or in frequent changes. Allow prints to dry naturally. Work with clean hands and clean dishes.

A Universal Developer.

No. 1.	Hydroquinone		160 grains.
	Bromide of potassium		30 ,,
	Sulphite of soda	(avoirdupois)	2 ounces.
	Water to		20 ,,
No. 2.	Soda hydrate		100 grains.
	Water		20 ounces.

Use as follows:—For negatives on Ilford plates: Equal parts Nos. 1 and 2.

For Ilford alpha lantern plates (for warm tone): One part No. 1; half part No. 2; two parts water.

For Ilford bromide papers: One part No. 1; one part No. 2; one part water.

For Ilford special lantern plates (for black tones): Equal parts Nos. 1 and 2.

Although it must be understood that, in our opinion, hydroquinone is somewhat inferior to ferrous oxalate for papers, yet we do not hesitate to put forward this universal developer as an alternative method of working for those who desire simplicity.

Note.—The clearing bath must not be used when developing with hydroquinone.

For Alpha Paper,

For producing Warm Toned Prints by Development.

Make the following solutions, and do not use until cold:—

No. 1.	Oxalate of potash (neutral)	(avoirdupois)	1 pound.
	Bromide of ammonium		320 grains.
	Warm water		64 ounces.
	Filter.		
No. 2.	Sulphate of iron	(avoirdupois)	4½ ounces.
	Citric acid	,,	½ ounce.
	Water	,,	80 ounces.
	Filter.		

For use, add one part of No. 2 to three parts of No. 1, not *vice versâ*.

THE IMPERIAL COMPANY'S FORMULÆ.

'Imperial Standard' Developer.

No. 1.

Pyrogallic acid	55 grains.
Metol	45 ,,
Metabisulphite of potash	120 ,,
Bromide of potassium	20 ,,
Water (boiled or distilled) to	20 ounces.

No. 2.

Carbonate of soda (washing soda)	4 ounces.
Water (boiled or distilled) to	20 ,,

For use take equal parts of No. 1 and No. 2.

'Imperial Universal' Developer.

No. 1.

Metol	40 grains.
Hydroquinone	50 ,,
Sulphite of soda	120 ,,
Bromide of potassium	15 ,,
Water (boiled or distilled) to	20 ounces.

No. 2.

Caustic potash	180 grains.
Water (boiled or distilled) to	20 ounces.

For use take equal parts of No. 1 and No. 2.

'Imperial Pyro-soda' Developer.

Stock Solution.

Pyrogallic acid	1 ounce.
Bromide of potassium	50 grains.
Metabisulphite of potash	40 ,,
Water (boiled or distilled) to	9 ounces.

No. 1.

Stock solution	3 ounces.
Water (boiled or distilled)	20 ,,

No. 2.

Sulphite of soda	2 ounces.
Carbonate of soda	2 ,,
Water (boiled or distilled) to	20 ,,

For use take equal parts of No. 1 and No. 2.

'IMPERIAL METOL' DEVELOPER.

No. 1.

Metol	100 grains.
Metabisulphite of potash	10 ,,
Bromide of potassium	20 ,,
Water (boiled or distilled) to	20 ounces.

No. 2.

Sulphite of soda	2 ounces.
Carbonate of soda	2 ,,
Water (boiled or distilled) to	20 ,,

For use take equal parts of No. 1 and No. 2.

'IMPERIAL HYDROQUINONE' DEVELOPER.

No. 1.

Hydroquinone	150 grains.
Metabisulphite of potash	10 ,,
Bromide of potassium	50 ,,
Water (boiled or distilled) to	20 ounces.

No. 2.

Sulphite of soda	2 ounces.
Caustic soda	100 grains.
Water (boiled or distilled) to	20 ounces.

For use take equal parts of No. 1 and No. 2.

'IMPERIAL SINGLE-SOLUTION' DEVELOPER.

Metol	50 grains.
Hydroquinone	40 ,,
Sulphite of soda	500 ,,
Bromide of potassium	25 ,,
Carbonate of soda	500 ,,
Water (boiled or distilled) to	20 ounces.

IMPERIAL 'SPECIAL' LANTERN PLATES.

For producing Transparencies of a Black Tone.

The exposure required for a negative of ordinary density will be about 5 seconds, at a distance of 24 inches from a medium sized gas burner.

Developing formula (hydroquinone) is the same as that used with our ordinary plates.

KODAK

N.B.—No Camera is a "KODAK" unless made by the Eastman Company.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

For development, use 1 part of No. 1 to 1 part of No. 2, and 1 part of water.

Metol developer is also excellent.

After development, the manipulations, washing, &c., will be the same as for negatives.

Imperial 'Slow' Lantern Plates.

For producing Transparencies of a Warm Tone.

The exposure required for a negative of ordinary density will be about 15 seconds, at a distance of 12 inches from a medium size gas burner.

Developing formula (hydroquinone) is the same as that used with 'special' lantern plates.

Imperial Bromide Opals.

Developers.

Metol. A.

No. 1.	Metol	50 grains.
	Dissolve in water	10 ounces
	Then add soda sulphite	1 ounce.
No. 2.	Soda carbonate (washing soda)	2 ounces.
	Water to	10
No. 3.	Potassium bromide	½ ounce.
	Water to	10 ounces.

The developer for normal exposures to consist of 8 parts of No. 1 to 1 part of No. 2, to each ounce of which may, as a rule, be added 20 minims of No. 3.

Oxalate and Iron. B.

No. 1.	Potash oxalate	4 ounces.
	Water	16 ,,
No. 2.	Iron sulphate	3 ounces.
	Water	12 ,,
	Citric acid	50 grains.

Pocket Kodak
For Film . . and . . . . . Glass Plates.
Weighs only 7 ounces.
Size of Pictures, 2 × 2½ inches.
LOADED IN DAYLIGHT.
PRICE £1 1s.
EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., and 60 Cheapside, LONDON.

Add 1 ounce of No. 2 to 5 ounces of No. 1; and to every ounce of developer add about 10 drops of a ten per cent. solution of potassium-bromide.

No. 2 solution must always be added to No. 1 and not *vice versâ*.

MARION'S FORMULÆ

For portraiture the following is recommended:—

PYRO STOCK SOLUTION.

Pyrogallic acid	1 ounce.
Sodium sulphite	4 ounces.
Sulphuric acid	1 drachm.
Water to make up	20 ounces.

SODA STOCK SOLUTION.

Sodium carbonate cryst.	8 ounces.
Sodium sulphite	4 ounces.
Potassium bromide	1 drachm.
Water to make up	20 ounces.

For Development.

Five ounces of each stock solution made up separately to 20 ounces with water and mixed in equal parts at the time of using. When very soft negatives are required—or only a minimum of exposure can be given—the bromide of potassium may be omitted.

PYRO-AMMONIA.

Pyrogallic acid	1 ounce.
Ammonium bromide	1 ,,
Citric acid	1 drachm.
Water to make up	10 ounces.

AMMONIA.

Strongest liquid ammonia ·880	2 ounces.
Water to make up	10 ,,

Pocket Kodak

Not a toy. Tiny, but efficient.
Slips into the Pocket.
Loads in Daylight.

PRICE £1 1s.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

Two ounces of each of above separately made with water to 20 ounces, form the solutions for use. Equal parts being mixed together at the time of development.

HYDROQUINONE DEVELOPER.

Hydroquinone Solution.

Hydroquinone	40 grains.
Sodium sulphite, pure	120 ,,
Potassium brom.	5 ,,
Citric acid	5 ,,

Water to make up to 10 ounces.

Alkali Solution.

Potass. hydrate, pure	120 grains.

Water to make up to 10 ounces.

This developer, mixed in equal proportions, will contain per ounce Hydroquinone, 2 grains; sulphite, 6 grains; brom., ¼ grain; citric, ¼ grain; hydrate, 4 grains.

FOR GELATINO-CHLORIDE PLATES.

IRON.

For Cold Tones.

No. 1.	Potass. citrate	100 grains.
	Potass. oxalate	30 ,,

Hot distilled water to make up to 1 ounce.

For Warm Tones.

No. 2.	Citric acid	90 grains.
	Ammonium carbonate	60 ,,

Cold distilled water to make up to 1 ounce.

For Extra Warm Tones.

No. 3.	Citric acid	130 grains.
	Ammonium carbonate	40 ,,

Cold distilled water to make up to 1 ounce.

Folding Pocket Kodak

Fine Lens. Novel and Simple Shutter.

Size of Picture, 3¼ × 2¼ inches.

LOADED IN DAYLIGHT. Price £2 2s.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., LONDON. And 60 Cheapside,

In mixing the solutions Nos. 2 and 3, it is better to place the crystals of the salts into a deep vessel, and, after adding the water, leave alone till all effervescence ceases. It is advisable to make it over night.

To three parts of either of the above add one part of the following at the time of using:—

Sulphate of iron	120 grains.
Sulphuric acid	1 drop.

Make up with distilled water to 1 ounce.

Either of these developers should give clear glass in the unexposed parts of the picture; but, if at any time the slightest fog is found, it should at once be cured by the addition of a trace of either potassium bromide or sodium chloride. Bromide is better with No. 1, and chloride with either No. 2 or No. 3. A convenient form of using these will be to keep a ten per cent. solution of each of these salts, and one or two minims to each ounce of developer will be found a powerful restrainer.

Hydroquinone.

No. 1.	Hydroquinone	48 grains.
	Sodium sulphite	320 ,,
	Ammonium bromide	2 ,,

Water to make up to 10 ounces.

No. 2.	Ammonium carbonate	100 grains.
	Sodium carbonate	100 ,,

Water to make up to 10 ounces.

Equal proportions of each are mixed together, according to size of plate to be developed at the time of using.

Different alkalies may be substituted for those mentioned, such as potassium carbonate, sodium silicate, potassium hydrate, sodium hydrate, &c.; but, in all cases, a small proportion of bromide should be used.

A number of plates may be developed one after the other in the same solution.

Eikonogen.

This developing agent, first introduced by us, will be found to give admirable results of a pleasing colour.

Folding Pocket Kodak

FOR CARTRIDGE FILMS.

Goes into any pocket. Size of Picture, 3¼ × 2¼ inches.

LOADED IN DAYLIGHT. Price £2 2s.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

Formula.

Sulphite soda, pure	200 grains.
Eikonogen	50 ,,
Potassium bromide	5 ,,
Water to make up to	10 ounces.
Sodium carbonate	160 grains.
Water to make up to	10 ounces.

Equal parts to be mixed together at time of using.

FOR CHLORO-BROMIDE PLATES.

Pyrogallic Development.

A. Pyrogallic acid	40 grains.
Pure sodium sulphite	16 ,,
Citric acid	5 ,,
Water	10 ounces.
B. Liq. am. fort.	40 minims.
Potassium bromide	40 grains.
Water to make up to	10 ounces.

Equal parts of the solutions to be mixed at the time of using.

A very pleasing warm colour will be obtained by adding to the B solution 200 grains of ammonium carbonate, but the time of development will be increased.

Ferrous-oxalate Development.

The saturated solutions of potassic oxalate and iron sulphate may be used in the proportion of three or four parts of the former to one of the latter, with the addition of one grain of potassium bromide to each ounce of developer, adding more bromide and increasing the amount of exposure when warmer tones are required.

To keep the iron solution from oxidising, one drop of sulphuric acid should be added to each ounce of water before dissolving the salt.

The ferrous-oxalate gives a blacker coloured image than pyrogallic developer.

The time of development will vary from two to four minutes, according to temperature and density of image required.

No. 2 BULL'S-EYE KODAK

Light and Simple. For Cartridge Films.

Makes pictures 3¼ × 3¼ inches.

LOADED IN DAYLIGHT.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 6c Cheapside, LONDON.

Hydroquinone Developer.

Hydroquinone Solution.

Hydroquinone	40 grains.
Sodium sulphite, pure	120 ,,
Potassium bromide	5 ,,
Citric acid	5 ,,
Water to make up to	10 ounces.

Alkali Solution.

Potassium hydrate, pure	80 grains.
Water to make up to	10 ounces.

Equal parts to be mixed together at time of using.

It is advisable that all solutions should be made with distilled water, though not absolutely essential.

Several plates may be developed in the same solution.

EIKONOGEN DEVELOPER.

This developer will be found to suit these equally well with slight modification.

A small proportion of bromide must be used to ensure absolute clearness in the unexposed parts.

Formula.

Sodium sulphite	400 grains.
Potassium bromide	5 ,,
Eikonogen	100 ,,
Water to make up to	10 ounces.
Sodium carbonate	320 grains.
Water to make up to	10 ounces.

Equal parts of each to be mixed together at time of using.

FOR ARGENTIC BROMIDE OPALS.

Formula for Amidol Developers.

Amidol	20 grains.
Sodium sulphite	200 ,,
Potassium bromide	20

Made up to 10 ounces with water.

No. 2 BULL'S-EYE KODAK

For Cartridge Film only. Achromatic Lens. Everset Shutter.

Takes Pictures 3¼ × 3¼ inches.

LOADED IN DAYLIGHT. PRICE £1 13s.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., and 60 Cheapside. LONDON.

Form the developer in one solution ready for use. Plates developed with this formula will not require the acid bath previous to fixing.

Formula for Eikonogen Developer.

Eikonogen	40 grains.
Sodium sulphite	160 ,,
Lithium carbonate	2 ,,
Water to make up to	10 ounces.

This will keep for a considerable time if well corked.

One drop of a ten per cent. solution of potassium bromide may be added to each ounce of developer.

Plates developed with eikonogen will not require the acid bath previous to fixing.

MAWSON & SWAN'S FORMULÆ.

THE 'MAWSON' OR 'CASTLE' PLATE.

DEVELOPERS.

Pyro-ammonia Developer.

Stock Solution (ten per cent.).

Pyrogallic acid	480 grains.
Bromide of ammonium	240 ,,
*Metabisulphite of potassium	480 ,,
Distilled water to make up (fluid)	10 ounces.

Dissolve the metabisulphite in part of the water, then add the other ingredients, and make up to bulk with water.

A. Stock solution	300 minims.
Distilled water to make up to (fluid)	10 ounces.
B. Liq. ammonia ·880	70 minims.
Distilled water to make up to (fluid)	10 ounces.

Use equal parts of A and B mixed at time of developing.

No. 4 BULL'S-EYE KODAK

For 5 × 4 inch Cartridge Film Pictures.

LOADED IN DAYLIGHT. Focussing scale.

Price £2 10s.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., and 60 Cheapside, LONDON.

Pyro-soda Developer.

	Pyrogallic acid	60 grains.
	*Metabisulphite of potassium	15 ,,
	Distilled water to make up to (fluid)	10 ounces.
B.	Washing soda	600 grains.
	Sulphite of soda	800 ,,
	Distilled water to make up to (fluid)	10 ounces

Use equal parts of A and B mixed at time of developing.

To correct errors in exposure :—If under-exposed, use a larger proportion of B ; if over-exposed, decrease the proportion of B, and add a few drops of a 10 per cent. solution of bromide of potassium.

* Metabisulphite of potassium is unequalled as a preservative of pyrogallic acid in solution. If not at hand, substitute for each grain of metabisulphite, sulphuric acid ½ minim *plus* sulphite of soda, 2½ grains.

Eikonogen Developer.

A.	Eikonogen	100 grains.
	Sulphite of soda (recrystd.)	100 ,,
	Distilled water to make up to (fluid)	10 ounces.
B.	Carbonate of potassium (com.)	1200 grains.
	Sulphite of soda (recrystd.)	500 ,,
	Distilled water to make up to (fluid)	10 ounces.

Use 3 parts of A to 1 part of B, mixed at time of devoloping.

Hydroquinone Developer.

A.	Hydroquinone	40 grains.
	Metabisulphite of potassium	40 ,,
	Bromide of potassium	5 ,,
	Distilled water to make up to (fluid)	10 ounces.
B.	Caustic potass (sticks)	80 grains.
	Distilled water to make up to (fluid)	10 ounces.

Use equal parts of A and B mixed at time of developing.

No. 2 BULLET KODAK *For Glass Plates as well as . . . . Cartridge Film.*

Size of Picture on Film, 3¼ × 3¼ inches; on Plates, 3¼ × 3¼ inches.

DAYLIGHT FILM CHANGING.

Price £2 2s.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside. LONDON.

The 'Mawson' Photo-mechanical Plate.

Developers.

Pyro-ammonia Developer.

A. Pyrogallic acid ..... 30 grains.
Bromide of ammonium ..... 30 ,,
Metabisulphite of potassium ..... 30 ,,
Distilled water to make up to .....(fluid) 10 ounces.

B. Liq. ammoniæ ·880 ..... 70 minims.
Distilled water to make up to .....(fluid) 10 ounces.

Use equal parts of A and B mixed at time of developing.

Hydroquinone Developer.

A Hydroquinone ..... 40 grains.
Bromide of potassium ..... 10 ,,
Metabisulphite of potassium ..... 40 ,,
Distilled water to make up to .....(fluid) 10 ounces.

B. Caustic potass (sticks) ..... 80 grains.
Distilled water to make up to .....(fluid) 10 ounces.

Use equal parts of A and B mixed at time of developing.

The 'Mawson Lantern' Plate.

Developers.

Exposure.—A negative of average density requires about 15 seconds at 1 foot from a No. 6 batswing burner. Short exposure tends to produce black tones; long exposure, brown tones.

Either of the following developers may be used, though we give the preference to the pyro-ammonia, greater variety of tone being available by it.

Development begins rather slowly, especially with the hydroquinone formula, afterwards proceeding more rapidly.

Pyro-ammonia Developer.

A. Pyrogallic acid ..... 20 grains.
Bromide of ammonia ..... 20 ,,
Metabisulphite of potassium ..... 50 ,,
Distilled water to make up to .....(fluid) 10 ounces.

No. 4 BULLET KODAK

FOR BOTH FILM AND GLASS PLATES.

Size of Picture, Film or Plates, 5 × 4 inches.

FILMS CHANGED IN DAYLIGHT. Price £3 3s.

Capacity—12 exposures of Film.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

B. Liq. ammoniæ ·880 ..... 70 minims.
Distilled water to make up to .....(fluid) 10 ounces.

Use equal parts of A and B mixed at time of developing.

Hydroquinone Developer.

A. Hydroquinone ..... 40 grains.
Bromide of potassium ..... 40 ,,
Metabisulphite of potassium ..... 40 ,,
Distilled water to make up to .....(fluid) 10 ounces.

B. Caustic potass (sticks)..... 80 grains.
Distilled water to make up to ..... (fluid) 10 ounces.

Use equal parts of A and B mixed at time of developing.

Eikonogen Developer.

A. Eikonogen..... 100 grains.
Bromide of potassium ..... 20 ,,
Sulphite of sodium (recrystd.) ..... 100 ,,
Distilled water to make up to ..... (fluid) 10 ounces.

B. Washing soda ..... 600 grains.
Distilled water to make up to ..... (fluid) 10 ounces.

Use equal parts of A and B mixed at time of developing.

Ferrous-oxalate Developer.

A. Neutral oxalate of potassium ..... 1200 grains.
Bromide of potassium ..... 5 ,,
Citric acid ..... 15 ,,
Distilled water to make up to .....(fluid) 10 ounces.

*B. Ferrous sulphate ..... 1600 grains.
Citric acid ..... 120 ,,
Distilled water to make up to ..... (fluid) 10 ounces.

Use 7 parts of A and 1 part of B, mixed at time of developing.

* Should this solution after keeping change to a brown colour, discard and mix afresh.

No. 4 CARTRIDGE KODAK

Very flat and compact. Every necessary movement.
Unique as a Cycle Camera. Takes Cartridge Films and Glass Plates.

Price £5 5s.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside. LONDON.

THE MAWSON OPAL PLATE.

Developer.

A.	Neutral oxalate of potassium	1200 grains.
	Bromide of potassium	5 ,,
	Citric acid	15 ,,
	Distilled water to make up to (fluid)	10 ounces.
B.	Ferrous sulphate	1600 grains.
	Citric acid	120 ,,
	Distilled water to make up to (fluid)	10 ounces.

Use 7 parts of A and 1 part of B, mixed at the time of developing.
Should B, after keeping, change to a brown colour, discard and mix afresh.

THE MAWSON BROMIDE PAPER.

Developer.

A.	Neutral oxalate of potassium	1200 grains.
	Bromide of potassium	5 ,,
	Citric acid	15 ,,
	Distilled water to make up to (fluid)	10 ounces.
B.	Ferrous sulphate	1600 grains.
	Citric acid	120 ,,
	Distilled water to make up to (fluid)	10 ounces.

Use 7 parts of A and 1 part of B, mixed at the time of developing.
Should B, after keeping, change to a brown colour, discard and mix afresh.

THE PAGET PRIZE PLATE COMPANY'S FORMULÆ.

PYRO AMMONIA.

No. 1.	Pyrogallic acid	1 ounce.
	Citric acid	60 grains.
	Sodium sulphite (pure)	2½ ounces.
	Distilled water to make	20 ,,

No. 4 CARTRIDGE KODAK

FOR CARTRIDGE FILMS AND GLASS PLATES.

Size of Picture, 5 × 4 inches.

DAYLIGHT CHANGING SYSTEM. Price £5 5s.

Rapid Rectilinear Lens.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

No. 2.	Liq. ammoniæ ·880	1	ounce.
	Ammonium bromide	80	grains.
	(For Phœnix plates, 120 grains.)		
	Distilled water to make	20	ounces.

One part of each to 10 parts of water.

PYRO SODA.

No. 1.	Pyrogallic acid	¼	ounce.
	Sulphuric acid	5	drops.
	Distilled water to make	20	ounces.
No. 2.	Carbonate of soda (cryst. pure)	2	ounces.
	Sulphite of soda (pure)	2	,,
	Distilled water to make	20	,,

Equal parts of each.

HYDROQUINONE.

No. 1.	Hydroquinone	1	ounce.
	Methylated spirit	10	ounces.
	Sulphurous acid	½	ounce.
	Potassium bromide	½	,,

Dissolve the hydroquinone in the spirit, and add the acid. In another vessel dissolve the potassium bromide in 3 ounces of distilled water. Mix the two solutions, and make up to 20 ounces with distilled water.

No 2.	Caustic soda (in sticks)	1	ounce.
	Sodium sulphite	5	ounces.
	Distilled water to make	20	,,

One part of each to 4 parts of water.

If this be found to give too hard a negative, use more water.

EIKONOGEN.

No. 1.	Eikonogen	½	ounce.
	Sodium sulphite	1½	,,
	Potassium bromide	8	grains.
	Distilled water to make	30	ounces.

Sixty grains hydroquinone added to above is a decided improvement, increasing brilliancy and density.

Cycle Kodak Cases

SPECIALLY CONSTRUCTED FOR ATTACHMENT TO CYCLES.

Very light—yet strong. Instantly available. Cannot slip. Attached in a moment.

Price *10s. 6d.*

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 6, Cheapside. LONDON.

No. 2. Potassium carbonate	1 ounce.
Distilled water to make	10 ounces.

Three parts of No. 1 to one part of No. 2.

Development.

For Black Tones any of the following formulæ are suitable :—

Pyro Ammonia.

Solution No. 1.

Pyrogallic acid	1 ounce.
Sodium sulphite	1½ ,,
Citric acid	½ ,,
Distilled water to	10 ounces.

Solution No. 2.

Liquor ammoniæ, ·880	1 ounce.
Ammonium bromide	1 ,,
Distilled water to	10 ounces.

For use, take 45 minims of each solution and make up with water to 2 ounces.

Ferrous-oxalate Developer.

Solution No. 1.

Neutral oxalate of potash	16 ounces.
Citric acid	60 grains.
Hot water	50 ounces.

Solution No. 2.

Proto-sulphate of iron	4 ounces.
Citric acid	15 grains.
Hot water	8 ounces.

Solution No. 3.

Bromide of potassium	½ ounce.
Water	10 ounces.

For development, take 6 ounces of No. 1 and add 1 ounce of No. 2 and 24 drops of No. 3. Gives cold black tones.

Solio Paper FOR . . . PRINTING OUT.

Rich in Silver. Can be lightly printed and afterwards developed.

In sheets - - 15/- per quire.

In handy cut sizes, 1/- per packet.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

Eikonogen Developer.

Solution No. 1.

Eikonogen	½ ounce.
Sodium sulphite	1½ ,,
Potassium bromide	8 grains.
Distilled water to	30 ounces.

Solution No. 2.

Potassium carbonate	1 ounce.
Distilled water to	10 ounces.

Take three parts of No. 1 to one part of No. 2 solution.

Rodinal Developer.

Rodinal concentrated solution	1 part.
Water	30 parts.

This is a very clean developer, and gives a rich black colour.

Hydroquinone.

Solution No. 1.

Hydroquinone	½ ounce.
Sulphurous acid	½ ,,
Potassium bromide	60 grains.
Water to	20 ounces.

Solution No. 2.

Caustic soda	½ ounce.
Sodium sulphite	2½ ounces.
Water to	20 ,,

For use, take ½ ounce of each to 1 ounce of water.

Solio Paper FOR . . . PRINTING OUT.

Made in White, Pink, Mauve, and Pensé.

In handy cut sizes, 1/- per packet.
In sheets - - 15/- per quire.

In Gross Boxes, C.D.V. and Cabinet size.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, **LONDON.**

WARM TONES.—DEVELOPER.

Solution No. 1.

Hydroquinone	½ ounce.
Sulphurous acid	¼ ,,
Potassium bromide	60 grains.
Water to	20 ounces.

Solution No. 2.

Caustic soda	½ ounce.
Sodium sulphite	2½ ounces.
Water to	20 ,,

Solution No. 3.

Bromide of ammonium	1 ounce.
Carbonate of ammonium	1 ,,
Water to	20 ounces.

Brown.

Exposure: 60 seconds 1 foot from gas-flame, or 2 inches of magnesium wire burnt at a distance of 3 feet. Developer: solution 1, ½ ounce; solution 2, ½ ounce; solution 3, 100 minims; water to 2 ounces. Time required in development, about 5 minutes.

Purple-brown.

Exposure: 90 seconds 1 foot from gas-flame, or 3 inches of magnesium wire burnt at a distance of 3 feet. Developer: solution 1, ½ ounce; solution 2, ½ ounce; solution 3, 200 minims; water to 2 ounces. Time required in development, about 10 minutes.

Purple.

Exposure: 3 minutes 1 foot from gas-flame, or 3 inches of magnesium wire burnt at a distance of 2 feet. Developer: solution 1, ½ ounce; solution 2, ½ ounce: solution 3, 250 minims; water to 2 ounces. Time required in development, about 12 minutes.

Matte Solio Paper
. . . FOR PRINTING OUT . . .
Softness with detail. Rich sepia tones with platinum bath.
Same prices as Glossy Solio.
EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

Red.

Exposure: 5 minutes 1 foot from gas-flame, or 5 inches of magnesium wire burnt at a distance of 2 feet. Developer: solution 1, ½ ounce; solution 2, ½ ounce; solution 3, 300 minims; water to 2 ounces. Time required in development, about 15 minutes.

PRINTING-OUT OPALS AND LANTERN PLATES.

Combined Toning and Fixing Bath.

No. 1 Stock.

Hyposulphite of soda	20 ounces.
Alum (potash alum only)	5 ,,
Sodium sulphate (not sulphite)	14 ,,
Water to	1 gallon.

Dissolve the hypo and alum each in about one quart of hot water, mix, and then add sodium sulphate already dissolved, making up to one gallon with remainder of water. This mixture should then be left for some hours for the precipitate to settle, when the clear solution may be poured off or filtered, and is then ready for use. It will keep indefinitely.

No. 2 Stock.

Gold chloride	15 grains.
Acetate of lead	64 ,,
Water (distilled)	8 ounces.

Dissolve the acetate of lead in the water, and add the gold. A heavy precipitate forms in this solution, which should be shaken up when any is to be poured out: it redissolves when added to No. 1 stock solution. For use: Mix 8 oz. of No. 1 with 1 oz. of No. 2. When this bath is used, the prints should *not* be washed *before* toning.

Separate Toning Bath.

Sulphocyanide of ammonium	30 grains.
Gold chloride	2½ ,,
Water	16 ounces.

Matte Solio Paper
A RICH PRINTING OUT PAPER WITH A DEAD MATTE SURFACE.
In handy cut sizes, 1/- per packet.
In sheets - - 15/- per quire.
In Gross Boxes, C.D.V. and Cabinet sizes.
EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

BROMIDE OPALS.

Development.

For black tones the following developer is the one chiefly used:—

Ferrous-oxalate Developer.

Solution 1.

Neutral oxalate of potash	16 ounces.
Citric acid	60 grains.
Hot water	50 ounces.

Solution 2.

Protosulphate of iron	4 ounces.
Citric acid	½ ounce.
(Or acetic acid, ½ drachm.)	
Hot water	8 ounces.

Solution 3.

Bromide of potassium	½ ounce.
Water	10 ounces.

For development take (when cold) 6 ounces of No. 1, and add 1 ounce of No. 2 and ½ drachm of No. 3.

For warm black tones use the hydroquinone developer, made up as follows:—

'BARNET' P.O.P.



ELLIOTT & SON, BARNET, HERTS.

Tropical Solio Paper

GELATINO-CHLORIDE, FOR PRINTING OUT.

Specially prepared for use in tropical climates and for withstanding heat and damp.

In handy cut sizes, 1/- per packet.
In sheets - - 15/- per quire.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

Hydroquinone Developer.

Solution 1.

Hydroquinone	½	ounce.
Sulphurous acid	½	,,
Potassium bromide	60	grains.
Water to	50	ounces.

Solution 2.

Caustic soda	½	ounce.
Sodium sulphite	2½	ounces.
Water to	50	,,

For use take equal parts of the two solutions. By increasing the exposure and using less of No. 1 Solution, still browner images can be obtained. Other developers, such as eikonogen, pyro, rodinal, &c., can also be used.

ROUCH'S FORMULÆ.

A. Pyrogallic acid	1	ounce.
Sulphite of soda	4	ounces.
Water, to make	10	,,

'BARNET'

FOR WARM OR COLD TONES.

LANTERN PLATE.

ELLIOTT & SON, BARNET, HERTS.

EASTMAN'S

Royal Bromide Paper

Toned rough surface. Fine broad effects.
Takes rich Sepia colour in Hypo-Alum Toning Bath.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

Dissolve the sulphite of soda in hot water, and, when cold, add the pyrogallic acid. Should any portion of the sulphite refuse to dissolve, the crystals may be allowed to remain in the bottle.

B.	Bromide of ammonium	1 ounce.
	Water, to make	10 ounces.
C.	Strongest liquor ammoniæ	3 ounces.
	Water, to make	10 "

In case sulphite of soda be not readily obtainable, the following may be substituted for solution A as above, and used in the same manner:—

Pyrogallic acid	1 ounce.
Citric acid	50 grains.
Water, to make	10 ounces.

Dissolve the citric acid first, and then add the pyro.

THE SANDELL WORKS COMPANY'S FORMULÆ.

A. Pyro Potash.

No. 1.	Pyro	1	ounce or	28· grammes.
	Sulphite soda	3	ounces ,,	85· ,,
	Bromide potassium	¾	,, ,,	21· ,,
	Citric acid	60	grains ,,	4· ,,
	Boiled or distilled water to	10	ounces ,,	300· c. c.

'Barnet' PLATES and PAPERS. . .

Works: BARNET, HERTS.

EASTMAN'S
Bromide Papers
WELL KNOWN AND UNIVERSALLY USED.
"Permanent" for daylight enlarging and for soft negatives.
"Extra Rapid" for enlarging by artificial light and for dense negatives.
For prices, see page 324.
EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., and 60 Cheapside. LONDON.

No. 2. Carbonate potash	2	ounces	„ 56·	grammes.
Sulphite soda	2	„	„ 85·	„
Boiled or distilled water to	10	„	„ 300·	„

B. Hydroquinone Metol.

No. 1. Hydroquinone	200	grains	or 13·	grammes.
Metol	20	„	„ 1·5	„
Sulphite soda	3	ounces	„ 85·	„
Bromide potassium	30	grains	„ 2·	„
Citric acid	30	„	„ 2·	„
Boiled or distilled water to	20	ounces	„ 600·	„
No. 2. Carbonate soda crystals	2	ounces	„ 56·	grammes.
Caustic soda	60	grains	„ 4·	„
Boiled or distilled water to	20	ounces	„ 600·	c. c.

C. Metol.

No. 1. Metol	120	grains	or 8·	grammes.
Sulphite soda	2	ounces	„ 56·	„
Bromide potassium	129	grains	„ 8·	„
Boiled or distilled water to	20	ounces	„ 600·	c. c.
No. 2. Carbonate soda crystals	2	ounces	„ 56·	grammes.
Boiled or distilled water to	20	„	„ 600·	c. c.

ELLIOTT & SON'S
'STUDIO'
WORKS: BARNET, HERTS. PLATE.

EASTMAN'S

Platino Bromide Paper

For highest class work, enlarging or contact. Perfect matte surface.
Tones to a permanent rich sepia colour.

For prices, see page 324

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

D. PYRO AMMONIA.

No. 1.	Pyro	1 ounce	or	28· grammes.
	Sulphite soda	3 ounces	,,	85· ,,
	Bromide ammonium	1 ounce	,,	28· ,,
	Citric acid	120 grains	,,	8· ,,
	Boiled or distilled water to	10 ounces	,,	300· c. c.
No. 2.	Liquid ammonia, ·880	1 ounce	,,	30· c. c.
	Boiled or distilled water	10 ounces	,,	300· ,,
No. 3.	Bromide ammonium	1 ounce	,,	30· grammes.
	Boiled or distilled water	10 ounces	,,	300 c. c.

THOMAS'S FORMULÆ.

PYROGALLIC ACID AND AMMONIA.

Stock Solutions.

No. 1.	Pyrogallic acid	1 ounce.
	Sodium sulphite	3 ounces.
	Potassium bromide	½ ounce.
	Citric acid	½ ,,
	Distilled or boiled water to make	10 ounces.

ELLIOTT & SON'S

ENLARGEMENTS.

Carbon, Bromide, & Platinotype.

WORKS:—BARNET, HERTS.

EASTMAN'S

Matte Bromide Paper

"Extra Rapid."—Specially suitable for portraiture.
Dead Matte Surface.—Can be toned to rich brown or sepia.
For prices, see page 324.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

No. 2. Liq. ammonia ·880 ..... 1 ounce.
Distilled or boiled water to make..... 10 ounces.

To make 1 ounce of developer, take 20 minims of No. 1 solution and 10 minims of No. 2 solution, and dilute with water to 1 ounce. When detail is out, add 10 minims more of No. 2 to increase density.

This formula represents 2 grains of pyro, 1 grain of potassium bromide, and 1 minim of liq. ammonia ·880 per ounce of developer. In case of under-exposure, these plates will bear the further addition of 1 minim of liq. ammonia ·880 (= 10 minims of No. 2 solution) without fogging.

Pyrogallic Acid and Soda.

Stock Solutions.

No. 1. Pyrogallic acid..... 1 ounce.
Sodium sulphite ..... 4 ounces.
Citric acid ..... ¼ ounce.
Potassium bromide..... ¼ ,,
Distilled or boiled water to make..... 20 ounces.

No. 2. Carbonate of soda (washing soda) ..... 6 ounces.
or boiled water to make ..... 20 ,,

To make 1 ounce of developer, take 1 drachm of each solution and 6 drachms of water.

Over-exposure requires less of No. 2, and under-exposure more.

CARBON TISSUE.

Manufactured by

ELLIOTT & SON, BARNET, HERTS.

Nikko Paper

FOR CONTACT PRINTING OR ENLARGING.

Takes highly enamelled surface. Has slight pink tint.

In Packets—Cut Sizes—For prices see page 324.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., and 60 Cheapside, LONDON.

This formula represents 3 grains of pyro and 18 grains of carbonate of soda in each ounce of developer.

METOL DEVELOPER.

No. 1.	Metol	100	grains.
	Sodium sulphite	2	ounces.
	Distilled or boiled water to make	20	,,
No 2.	Carbonate of potash	½	ounce.
	Carbonate of soda, crystals (washing soda)	1	,,
	Potassium bromide	40	grains.
	Distilled or boiled water to make	20	ounces.

For normal exposure take equal parts of each solution.
For over-exposure take less of No. 2.

HYDROQUINONE-SODA DEVELOPER.

No. 1.	Hydroquinone	160	grains.
	Sodium sulphite	2	ounces.
	Citric acid	60	grains.
	Potassium bromide	40	,,
	Distilled or boiled water to make	20	ounces.
No. 2.	Sodium hydrate	160	grains.
	Distilled or boiled water to make	20	ounces.

Take equal quantities of each solution, mixed with the same quantity of water.

ELLIOTT & SON'S

Artistic Finishing of Enlargements.

WORKS:—BARNET, HERTS,

X-RAY PAPER

An extremely rapid paper for direct radiography.
Supersedes dry plates.
One print or a dozen at one exposure.

For prices see page 324.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

In hot weather 3 or 4 grains of potassium bromide may be added to each ounce of diluted developer.

An addition of 2 or 3 grains of potassium bromide to each ounce of developer will always give a clearer and more brilliant image.

Transparency Developers.

Hydroquinone.

No. 1.	Hydroquinone	160 grains.
	Sodium sulphite	2 ounces.
	Citric acid	60 grains.
	Potassium bromide	40 ,,
	Water to	20 ounces.
No. 2.	Sodium hydrate	160 grains.
	Water to	20 ounces.
No. 3.	Bromide ammonium	2 ounces.
	Water to	20 ,,
No. 4.	Carbonate ammonium	2 ounces.
	Water to	20 ,,

Pyrogallic Acid.

No. 1.	Pyrogallic acid	1 ounce.
	Sulphite soda	3 ounces.
	Citric acid	¼ ounce.
	Water to	10 ounces.

'BARNET'

SAME PRICE AS 'ORDINARY.

EXTRA RAPID PLATE.

ELLIOTT & SON, BARNET. HERTS.

EASTMAN'S
TRANSPARENT FILM

Extremely portable and convenient for storing.
Easily developed.
Supplied in daylight cartridges and in patent spools for roll holders.

EASTMAN Photographic Materials Co. Ltd.,
115-117 OXFORD ST., LONDON,
And 6a Cheapside.

No. 2.	Liq. ammonia ·880	1 ounce.
	Water to	10 ounces.
No. 3.	Bromide ammonium	1 ounce.
	Water to	10 ounces.
No. 4.	Carbonate ammonia	1 ounce.
	Water to	10 ounces.

Exposures and development formulæ with approximate time required for development at temperature of 60 degrees.

Black Tone.

Hydroquinone.

Exposure, 1 in. Mg., Distance 3 feet.

Developer	No. 1	½ ounce.
,,	No. 2	½ ,,
Water to		2 ounces.

Time, about 2 minutes.

Pyro.

Exposure, same as with Hydro.

Developer	No. 1	30 minims.
,,	No. 2.	30 ,,
,,	No. 3.	30 ,,
Water to		2 ounces.

Time, about 2 minutes.

'BARNET' PLATINO-MAT BROMIDE PAPER.

ELLIOTT & SON,
BARNET, HERTS.

Developing and Printing from Kodak Films.

For prices see page 325.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., and 60 Cheapside, LONDON.

Brown Tone.

Hydroquinone.

Exposure, 2 in. Mg., Distance 1 foot.

Developer	No. 1.	½ ounce.
,,	No. 2.	½ ,,
,,	No. 3.	15 minims.
,,	No. 4.	15 ,,
Water to		2 ounces.

Time, about 7 minutes.

Pyro.

Exposure, same as with Hydro.

Developer	No. 1.	30 minims.
,,	No. 2.	30 ,,
,,	No. 3.	45 ,,
,,	No. 4.	45 ,,
Water to		2 ounces.

Time, about 7 minutes.

'BARNET' Plates, Films, Papers.

ELLIOTT & SON, BARNET, HERTS.

BULL'S-EYE TRIPOD

VERY COMPACT, LIGHT, AND CONVENIENT.

For Cameras up to 5 × 4.

Folds in two sections. Has leather hand strap for carrying.

Price 8s. 6d.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

Purple Tone.

Hydroquinone.

Exposure, 3 in. Mg., Distance 1 foot.

Developer	No. 1.	½ ounce.
,,	No. 2.	½ ,,
,,	No. 3.	30 minims.
,,	No. 4.	30 ,,
Water to	.....	2 ounces.

Time, about 10 minutes.

Pyro.

Exposure, same as with Hydro.

Developer	No. 1.	30 minims.
,,	No. 2.	30 ,,
,,	No. 3.	120 ,,
,,	No. 4.	120 ,,
Water to	.....	2 ounces.

Time, about 10 minutes.

Enlargements.

Price List Post Free.

ELLIOTT & SON, BARNET, HERTS.

Pocket Kodak Tripod

Closes together forming a Staff or Cane.
Made of best seasoned maple. Weighs only 1 lb.

Price 7s.

EASTMAN Photographic Materials Co. Ltd., 115-117 OXFORD ST., And 60 Cheapside, LONDON.

Red Tone.

Hydroquinone.

Exposure, 6 in. Mg., Distance 1 foot.

Developer	No. 1.	½ ounce.
,,	No. 2.	½ ,,
,,	No. 3.	90 minims.
,,	No. 4.	90 ,,
Water to	.....	2 ounces.

Time, about 15 minutes.

N.B.—For the warm tones, development must be carried much beyond what is apparently sufficient, so much is lost in fixing. A yellow light is recommended to be used, as it greatly facilitates judging of tone. It should also be mentioned that richness of tone is entirely dependent on depth to which development is carried.

Fixing Bath.

We recommend the following as giving great immunity from stain :—

Hypo.....	5 ounces.
Sulphite of soda	1 ounce.
Water	20 ounces
Dissolve and add sulphuric acid	1 drachm.

THE Plate for SHUTTER Work.

ELLIOTT & SON'S

'ROCKET' PLATE.

WORKS:—BARNET, HERTS.

WRATTEN & WAINWRIGHT'S FORMULÆ.

I.—Pyrogallic Acid.

Stock Solution A.

Liquor ammoniæ, s.g. ·880	1 ounce.
Potassium bromide	60 grains.
Water	2 ounces.

*Stock Solution B.**

Pyrogallic acid	1 ounce.
Citric acid or sulphurous acid	½ drachm.
Water	10 ounces.

* For the 'Ordinary' plates, B should contain only half the quantity of pyrogallic acid.

Stock Solution C.

Potassium bromide	20 grains.
Water	1 ounce.

Stock Solution D.

Liquor ammoniæ, s.g. ·880	1 drachm.
Water	1 ounce.

II.—For Drop Shutter Special Plates.

Stock Solution B.

Pyrogallic acid	1 ounce.
Citric acid or sulphurous acid	½ drachm.
Water	10 ounces.

Stock Solution A.

Liquor ammoniæ, ·880	1 ounce.
Bromide potassium	100 or 120 grains.
Water	2 ounces.

Soda Developer.

No. 1.	Sulphite of soda	6 ounces.
	Water	80 ,,
	Sulphuric acid (pure)	1 drachm.
	Pyro	1 ounce.
No. 2.	Carbonate of soda	6 ounces.
	Water	80 ,,

Mix in equal parts for correct exposures.

THE GELATINO-CHLORIDE PROCESS.

BARKER'S FORMULA FOR PRINTING-OUT EMULSION.

Gelatine (Nelson's No. 1 and Coignet's, equal parts)	175 grains.
Chloride of ammonium	18 ,,
Rochelle salts	50 ,,
Nitrate of silver	75 ,,
Alcohol	4 drachms.
Water	5 ounces.

Heat to 100° Fahr., and allow to remain at this temperature after all is dissolved for ten minutes, after which proceed in the usual way.

Toning Baths for the Foregoing.

Wash the prints in clean water and then *tone* in the following:—

1. A. Distilled water	25 ounces.
Acetate of soda (recrystallised)	1 ounce.
Into which pour a solution of 1 per cent. of chloride of gold	2 ounces.
B. In ten ounces of distilled water, dissolve two drachms of sulphocyanide of ammonium, and add one ounce solution of 1 per cent. chloride of gold.	

For toning, mix in the proportion of twenty ounces of A to six of B. if possible the evening before using.

Another.

2. A. Water	8 ounces.
Chloride of gold	2 grains.
B. Water	8 ounces.
Sulphocyanide of ammonium	40 grains.
Hyposulphite of soda	1 grain.
Carbonate of soda	3 grains.

These are mixed together by one part of A being poured into an equal part of B; in no case the reverse.

SOLIO COMBINED TONING AND FIXING BATH.

No. 1.

Hypo	20 ounces.
Alum	5 ,,
Soda sulphate	10 ,,
Potash sulphate	2 ,,
Water	160 ,,

No. 2.

Gold chloride	15 grains.
Lead acetate	64 ,,
Water	8 ounces.

For use, eight ounces of No. 1 solution; one ounce of No. 2.

A red precipitate is thrown down in the gold solution, but, if shaken before addition to the hypo, it will be redissolved.

Formula for Blue Tones.

No. 1.

Borax	600 grains.
Water	160 ounces.

No. 2.

Gold chloride	15 grains.
Water	15 ounces.

For use, eight ounces of No. 1; half ounce of No. 2. The solutions must be kept separate.

A COMBINED TONING AND FIXING BATH.

Water	20 ounces.
Hypo	5 ,,
Citric acid	60 grains.
Acetate of lead	60 ,,
Sulphocyanide of ammonium	240 ,,

These are added, and dissolved in the order given, and the solution allowed to stand for twenty-four hours. A precipitate will then be thrown down, and the clear solution decanted off. Then add—

Chloride of gold	3 grains.

ILFORD PRINTING-OUT PAPER.

Working Instructions.

Printing.—This should be done in shade by preference, unless negatives are specially strong in contrast. The image loses very little depth in toning, &c.

First washing.—For 15 minutes in several changes.

Toning.—For simplicity and excellence of results we recommend the following :—

Water	16 ounces.
Sulphocyanide of ammonium	30 grains.
Chloride of gold	2 ,,

The prints tone in this bath in about 6 minutes, and it should be borne in mind that prints dry somewhat darker and much colder than they appear when wet. The bath should not be used many times; indeed, it is well to make a stock sulphocyanide solution in bulk, and take as much of it as is needed, adding the gold as wanted. A bath with double quantity of water tends to warm tones.

Second washing.—For 5 minutes in several changes.

Fixing.—Use new solution for each batch of prints. The following is best strength :—

Hypo	3 ounces.
Water	20 ,,

Fixation is complete in about 10 minutes.

Final washing.—For at least 2 hours in running water, or many changes

Drying.—Lay the prints face upwards on the blotting paper (or hang up by clips), and allow to dry naturally. Mount with starch paste in usual way.

Alum bath.—If weather is hot, and the surface of the prints becomes soft, immerse for 10 minutes in alum bath (water, 20 ounces; alum, 2 ounces), after the first washing, and before toning, then wash for 10 minutes before putting into toning bath.

Special notes.—Do not use any excess of sulphocyanide over quantity mentioned.

Use the washing water and all solutions as cold as possible.

Keep the prints moving whilst in the various solutions.

Above remarks apply to both varieties of P.O.P., matt and glossy.

IMPERIAL P.O.P.

Directions for Use.

Hard negatives should be printed in strong light, delicate negatives only in the shade.

Prints should be rather darker than the finished picture is desired.

We specially recommend the following bath and mode of procedure for excellence and uniformity of result.

After printing, wash thoroughly for ten to fifteen minutes in running water before immersion in the Toning Solution.

In hot weather, if the surface of the prints become soft, immerse after washing, in an alum bath (alum 1 ounce, water 10 ounces), leave for ten minutes, wash again in running water for five to ten minutes and place in the following toning bath.

Sulphocyanide Toning Bath.

Stock Gold Solution.

Chloride of gold	15 grains.
Water (distilled or boiled) to	15 drachms.
No. 1. Sulphocyanide of ammonium	75 grains.
Water (boiled or distilled) to	20 ounces.
No. 2. Stock gold solution	5 drachms.
Water to	20 ounces.

For use, take equal quantities of No. 1 and No. 2.

Add solution No. 2 slowly to solution No. 1, stirring all the time. Make up the solutions exactly as above, and follow out the instructions carefully.

The prints should tone in five to ten minutes.

When toning has been judged sufficient, wash for about five minutes and transfer to the following fixing bath :—

Hyposulphite of soda	3 ounces.
Water to	20 ,,

After fixation is complete (about ten minutes), wash thoroughly for one hour.

THE SYLVIO PAPER.

WELLINGTON & WARD, ELSTREE, HERTS.

The phosphate toning bath is recommended:—

Phosphate of soda	40 grains.
Gold chloride	2 ,,
Water	16 ounces.

The bath should be used as soon as it is mixed.

PAGET PRIZE GELATINO-CHLORIDE PRINTING-OUT PAPER.

ORDINARY OR MATT SURFACE.

Printing should be somewhat darker than the finished print is required.

It should be borne in mind, when toning, that the finished image will be bluer and slightly stronger when dry than in the wet state.

Toning.—The following bath is strongly recommended in preference to any other:—

Sulphocyanide of ammonia	30 grains.
Gold chloride	2½ ,,
Water	16 ounces.

Before immersion in this toning bath, the prints should be *very thoroughly washed* for at least fifteen minutes in running water. This is necessary to ensure even toning.

If the toning bath be found to tone too quickly, sulphite of soda equal in quantity to the gold used (*i.e.*, 2½ grains for above quantity) may be added. This will make the bath work more slowly, without making any other difference. More or less may be used so as to regulate to speed desired. The sulphite should be kept in a stock solution and added to the bath immediately before use.

In hot weather, if necessary, the print may be soaked in alum (alum, 4 ounces; water, 20 ounces) for five minutes before toning in this bath. Another thorough washing is necessary between the alum and toning baths.

MARIONA PAPER (P.O.P.).

Directions.—Print as with albumenised papers, slightly darker than required for the finished picture, or for partial development, as instructions below.

Washing.—After printing, wash thoroughly in several changes of water from ten to fifteen minutes.

Toning.—This paper may be toned with any of the usual baths, but the following are recommended:—

PLATINUM TONING.—FOR SEPIA TONES.

Stock Solution.

A. Potassium chloro-platinite, 15 grains in 15 ounces of water, to which have been previously added 5 minims of hydrochloric acid.

B. Citric acid ..... 160 grains.
Chloride sodium ..... 160 ,,
Water ..... 8 ounces.

Take 2 ounces from A and 1 ounce from B, and make up to 1½ pints with water. This is sufficient for toning two sheets.

Gold Toning.—Carbonate Bath.

A. Stock solution of gold chloride, 15 grains tube in 15 ounces of water.
B. Sodium carbonate (common washing soda), 30 grains in 15 ounces of water.

Take 2½ ounces each of A and B, and make up to 1 pint. This should tone about 2½ sheets of paper.

Gold Toning.—Sulphocyanide Bath.

A. Stock solution of gold chloride, 15 grains in 15 ounces of water.
B. Stock solution of ammonium sulphocyanide containing 15 grains to every ounce of water.

For use, take 1 ounce each of A and B, and make up to 8 or 10 ounces with water, for each sheet of paper to be toned. The bath should be fresh every time.

Washing after Toning.—To be thoroughly washed in several changes of water, then placed in the fixing bath.

Fixing Bath.—Dissolve 3 ounces of hypo in 1 pint of water. Keep the prints moving for at least 10 minutes.

Final Washing.—In running water, or several changes of water, for at least two hours.

Alum Bath.—In warm weather or hot climates it is advisable to use this bath before toning; strength about ten per cent, or chrome alum one per cent, for ten minutes, prints being again thoroughly washed before toning.

Partial Development.—This method will be found very convenient in dull weather, or even at night by magnesium or electric light. Print till the image is fairly visible, then immerse without washing in a ten per cent. solution of potassium bromide for four or five minutes. Then, after washing for a few minutes, place the print in the following developer mixed in equal proportions:—

A. Hydroquinone ..... 80 grains.
Sodium sulphite ..... 320 ,,
Make up to 1 pint with distilled water.

B. Sodium carbonate ..... 400 grains.
Ammonium carbonate ..... 400 ,,
Ammonium bromide ..... 40 ,,
Make up to 1 pint with distilled water.

Continue the development until all but the faintest details are visible, then immediately wash the print thoroughly in running water to remove entirely the developer before placing it in the toning bath. All after-treatment will be the same as given above for printed-out prints.

THE COLLODIO-CHLORIDE PROCESS.

PAGET PRIZE COLLODIO-CHLORIDE PRINTING-OUT PAPER.

Printing should be somewhat darker than the finished print is required; about the same as for our P.O.P., not quite so dark as for albumen.

Keeping.—Both the unprinted pieces of paper and the untoned prints are best kept in a cool place, closely packed together, flat, and under slight pressure. If left loosely exposed to the air, the collodion film may dry and harden, becoming more liable to crack during the toning and subsequent operations. Toning should be done as soon after printing as convenient; the same day, or, at farthest, the next day if possible.

Washing.—Before immersion in the toning bath, the prints should be *very thoroughly washed* for at least five minutes in running water or in three or four changes. If running water from a tap be used, it should not be turned on too violently, as it may tear or injure the film.

Alum.—After washing, it is strongly recommended that the prints be placed in an alum bath (alum, 4 ounces; water, 1 pint) for five minutes, and then washed for a quarter of an hour before toning. The alum has no action on the collodion film, but hardens the prepared paper underneath, and effectually prevents any softening or peeling in the subsequent operations. If the alum be well washed out, toning proceeds even more easily than if alum had not been used.

Toning.—Any of the ordinary toning baths employed for albumen or gelatine may be used, but no bath gives such rich, brilliant tones, either warm or cold, as the sulphocyanide. If a little care be taken to ensure clean dishes and clean fingers, there is no bath more simple or certain. We strongly recommend this bath in preference to any other.

Sulphocyanide of ammonia	30 grains.
Gold chloride	2 ,,
Water	16 ounces.

Tone to exactly the colour desired, judging the prints as they lie in the dish; but it should be borne in mind that the finished image will be slightly bluer and stronger when dry than in the wet state. Wash and fix in

Hyposulphite of soda	3 ounces.
Water	1 pint.

If this bath be found to tone too quickly, sulphite of soda may be added at the rate of ¼ to ½ grain for every grain of gold used (say 1 grain for above quantity). This will make the bath work more slowly, without making any other difference. More or less may be used, so as to regulate to speed desired. The sulphite should be kept in a stock solution, and added to the bath immediately before use.

Allow at least ten minutes for fixing. Wash thoroughly in running

water for at least an hour. Do not on any account wash longer than two hours; never leave in the water all night.

The prints may be damped off on blotting-paper and left to dry, or may be dried quickly in a moderate heat. They should *not* be left to dry *between* blotting-paper unless the latter is known to be pure. Impure blotting-paper makes spots and mottled marks on the prints.

THE ALBUMEN PROCESS.

PRESERVATIVES FOR SENSITISED ALBUMEN PAPER.

1.—Sensitise the paper in the usual bath, drain well, and when superficially dry float the back of the paper for twenty minutes on a solution of

Citric acid	1 ounce.
Water	30 ounces.

Or,

2.—Sensitise as usual, drain well, and wash the paper in three or four changes of water, then float the back on a solution of

Nitrite of potassium	5 ounces.
Water	100 ,,

When dry, roll the paper up, coated side out, and wrap in blotting-paper soaked in the nitrite of potash solution, and dried.

TONING FORMULÆ FOR ALBUMEN PRINTS.

No. 1.	Chloride of gold	1 grain.
	Acetate of soda	30 grains.
	Water	8 ounces.

This must not be used till one day after preparation. It keeps well, and gives warm, rich tones.

No. 2.	Chloride of gold	1 grain.
	Bicarbonate of soda	4 grains.
	Water	8 ounces.

This is ready for immediate use after preparation, but it will not keep.

No. 3.	Chloride of gold	1 grain.
	Phosphate of soda	20 grains.
	Water	8 ounces.

This gives rich tones of a deep purple nature, but must be used soon after preparation.

No. 4.	Gold solution	10 drachms.
	Acetate of lime	20 grains.
	Chloride of lime	1 grain.
	Tepid water	20 ounces.

The 'gold solution' before mentioned is prepared by neutralising as much as is required of a one-grain solution of chloride of gold by shaking it up with a little prepared chalk, then allowing it to settle, and filtering off the clear liquid. This toning bath improves by keeping. To use, add two ounces of it to eight ounces of tepid water, which will prove sufficient to tone a full-sized sheet of paper.

No. 5.	Chloride of gold	15 grains.
	Water	5 ounces.

Neutralise with lime water, make up to fifteen ounces with water, and add two drachms of chloride of calcium. This stock solution will keep for a long time for use. Dilute one ounce with ten ounces of water.

Toning and Fixing in One Bath.

No. 6.	Chloride of gold	1 grain.
	Phosphate of soda	15 grains.
	Sulphocyanide of ammonium	25 ,,
	Hyposulphite of soda	240 ,,
	Water	2 ounces.

Dissolve the gold separately in a small quantity of water, and add it to the other solution.

Ingall's Toning Formula.

	Hard water (fluid)	20 ounces.
	Bi-carbonate of potash	20 grains.
	Gold	2 ,,

= 2 drachms solution 1 grain to 1 drachm hard water.

NEGATIVE INTENSIFIERS.

Monckhoven's.

1. A.	Bromide of potassium	10 grains.
	Bichloride of mercury	10 ,,
	Water	1 ounce.
B.	Pure cyanide of potassium	10 grains.
	Nitrate of silver	10 ,,
	Water	1 ounce.

Place the negative in A till it is white, then rinse and transfer it to solution B. If the intensification has been carried too far, it may be reduced by treatment with a weak solution of hyposulphite of soda.

MERCURY AND AMMONIA.

Pour over the negative a saturated solution of mercuric chloride (bichloride of mercury); do not keep it on too long, unless the negative is very thin. Wash well, and immerse in bath of—

Water	10 ounces.
Ammonia	10 minims.

Leave the plate in this solution until the black colour goes quite through the film.

MERCURY WITH SODIUM SULPHITE.

Whiten the negative in the saturated solution of mercuric chloride, wash and blacken with a solution of sulphite of sodium 1 in 5.

IODIDE OF MERCURY.

Dissolve one drachm of bichloride of mercury in seven ounces of water, and three drachms of iodide of potassium in three ounces of water, and pour the iodide solution into the mercury till the red precipitate formed is completely dissolved.

For use, dilute with water, flow over the negative till the proper density is reached, and wash, when the deposit will turn yellow. Remove the yellow colour by flowing a five per cent. solution of hypo over the plate, and give it the final washing.

URANIUM.

Uranium nitrate	12 grains.
Potassium ferricyanide	15 ,,
Water (fluid)	4 ounces.

Before using this intensifier, great care is necessary that every trace of hypo is dissolved from the film, or red fog will result.

FERRICYANIDE OF LEAD.

The negative, after washing, is placed in a solution made as follows:—

Lead nitrate	20 grains.
Ferricyanide of potassium	30 ,,
Distilled water	1 ounce.

After this it is again thoroughly washed until the drainings from the plate give a scarcely perceptible blue colour with ferrous-sulphate solution, and then ammonium sulphide (one part to ten parts of water) is poured over it.

BROMIDE OF COPPER.

A. Potassium bromide	180 grains.
Water	10 ounces.
B. Cupric sulphate	240 grains.
Water	10 ounces.

Mix the solutions, and, after standing a few hours, decant or filter out any potassium sulphate that may be precipitated. The solution will keep indefinitely, and may be used over and over again.

The *modus operandi* of intensification is the same as with the mercuric salt. The darkening or rendering sufficiently opaque of the deposit can be done by a solution of ammonia in water—say, water, 10 ounces; stronger solution of ammonia, 1 drachm. The application of any old developer will bring about the same result.

NEGATIVE REDUCERS.

FARMER'S.

Saturated solution of ferridcyanide of potassium 1 part.
Hyposulphite of soda solution, 1·5 ..... 10 parts.

L. BELITZKI'S.

Potassium ferric oxalate ..... 1 to 10 grains.
Hyposulphite of soda solution, 1 to 5 ..... 1 ounce.

CYANIDE REDUCING SOLUTION.

Cyanide of potassium	20 grains.
Iodide of potassium	10 ,,
Bichloride of mercury	10 ,,
Water	10 ounces.

Reduction takes place slowly and is easy to control. After reducing, the negative should be washed thoroughly.

Perchloride of iron	30 grains.
Citric acid	60 ,,
Water	1 pint.

ORTHOCHROMATIC PROCESSES.

F. E. IVES'S.

Use any good bromide collodion emulsion that contains no free nitrate of silver. Flow plate as usual, and, as soon as the emulsion film sets, flow several times with strong alcoholic solution of chlorophyl from blue myrtle or plantain leaves, then immerse in water strongly tinted with blue shade eosine, and keep in motion until smooth.

Sensitises for all colours, including deep ruby red. A very light yellow screen is sufficient to secure correct rendering of colour tone.

V. SCHUMANN'S (GELATINE PLATES).

Soak the plate in 200 c. c. of water and 2 to 4 c. c. of ammonia for two to three minutes, then immerse in

Distilled water	200 c. c.
Alcohol	10 ,,
Ammonia	4 ,,
Alcoholic solution of cyanine, 1 : 500	10 ,,

DRS. MALLMANN AND SCOLIK'S (GELATINE PLATES).

Preliminary Bath.

A. Water	200 c. c.
Ammonia	2 ,,

Soak the plate for two minutes.

Colour Bath.

Erythrosine solution, 1·1000	25 c. c.
Ammonia	4 ,,
Water	175 ,,

The plate should not remain longer in this bath than one and a quarter minute. A longer time depresses the general sensitiveness.

Alcohol	500 c. c.
Chinoline red	1 gramme.

To which are added 50 c. c. of a solution of—

Alcohol	500 c. c.
Chinoline blue (cyanine)	1 gramme.

OBERNETTER'S FORMULA.

Distilled water	480 c. c.	= 16	fluid ounces.
Nitrate of silver	1·25 gramme	= 25	grains.
Ammonium carbonate	5 ,,	= 75	,,
Erythrosine solution (1 in 500)	35 c. c.	= 1⅛	fluid ounces.
Strong ammonia	4 c. c.	= 1	drachm.

Bathe the plate in the preliminary solution (Mallmann and Scolik's formula) for 150 seconds.

Without washing, flow the sensitising solution over the plate twice, and dry in the dark closet.

HYPO ELIMINATORS CLEARING SOLUTIONS, &c.

TO RESTORE FADED NEGATIVES.

Mr. W. E. Debenham recommends the following solution for the purpose of restoring printing force to negatives which have faded after mercurial intensification:—

Schlippe's salt	10 grains.
Water	1 ounce.

Wet the film thoroughly by soaking in a dish of water, and immerse in the restoring solution until the desired effect is obtained.

TO REMOVE THE LAST TRACES OF HYPO FROM THE FILM.

Hydroxyl.

Peroxide of hydrogen (twenty vols.)	1 drachm.
Water	5 ounces.

After washing the negative well it is immersed for a couple of minutes in the solution and again rinsed in water, when the intensification with silver can be at once proceeded with.

Another.

Where peroxide of hydrogen is not obtainable the following may be used as a substitute, the solution containing that substance in combination with others :—

Barium dioxide	1 ounce.
Glacial acetic acid	1 ,,
Water	4 ounces.

Reduce the barium dioxide to a fine powder and add it gradually to the acid and water, shaking until dissolved. A few minutes' immersion in this solution will effectually remove or destroy the last traces of hypo.

Alum.

A simple plan brought forward by Captain Abney for this specific purpose consists in employing a saturated solution of alum in place of the solution of hydroxyl or peroxide of hydrogen.

Eau de Javelle.

Dry chloride of lime (hypochlorite of lime)	2 ounces.
Carbonate of potash	4 ,,
Water	40 ,,

Mix the chloride of lime with thirty ounces of the water ; dissolve the carbonate of potash in the remainder. Mix, boil, and filter.

Labarraque's Solution.

Chloride of lime	2 ounces.
Carbonate of soda	4 ,,
Water	40 ,,

Mix the chloride of lime with thirty ounces of the water, and dissolve the carbonate of soda in the remainder. Mix, boil, and filter.

CLEARING SOLUTIONS.

Alum	2 ounces.
Citric acid	1 ounce.
Water	10 ounces.

Wash moderately after fixing, and immerse the negative in the above.

ANOTHER.

Saturated solution of alum	20 ounces.
Hydrochloric acid (commercial)	1 ounce.

Immerse the negative after fixing, having previously washed it for two or three minutes under the tap; wash well after removal from the alum and acid.

NEGATIVE VARNISHES, FORMULÆ FOR.

No. 1.	Sandarac	4 ounces.
	Alcohol	28 „
	Oil of lavender	3 „

This is a good varnish for retouching upon, as a 'tooth is easily obtained by rubbing.

No. 2.	White hard varnish	15 ounces.
	Methylated alcohol	20 to 30 „

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off. Very suitable for enlarged negatives that are not to be retained.

Tough, hard, and durable:—

No. 3.	Bleached shellac	1½ ounce.
	Mastic	½ „
	Oil of turpentine	½ „
	Sandarac	1½ „
	Alcohol	20 fluid ounces.
No. 4.	Sandarac	80 ounces.
	Turpentine	36 „
	Oil of lavender	10 „
	Alcohol	500 „

This one may be rubbed down with powdered resin, and gives a splendid surface for retouching:—

No. 5.	Sandarac	1 ounce.
	Seed lac	1½ „
	Castor oil	3 drachms.
	Oil of lavender	1½ drachm.
	Alcohol	18 fluid ounces.

This varnish is somewhat dark in colour.

No. 6.	Best orange shellac	2½ ounces.
	Oil of lavender or oil of turpentine	½ ounce.
	Methylated alcohol	1 pint.

Keep in a warm place until dissolved; then add a large teaspoonful of whiting or prepared chalk; set aside to clear, and then decant. This is specially recommended for gelatine negatives.

Retouching Varnish.

Sandarac	1 ounce.
Castor oil	80 grains.
Alcohol	6 ounces.

First dissolve the sandarac in the alcohol, and then add the oil.

In the above formulæ the proportions of alcohol must be taken as approximate, as different samples of resins vary, some giving more viscous solutions than others.

Ground-glass Varnish.

Sandarac	90 grains.
Mastic	20 ,,
Ether	2 ounces.

Dissolve the resins in the ether and afterwards add

Benzole	½ to 1½ ounce.

The proportion of the benzole added determines the nature of the matt obtained.

THE WET-COLLODION PROCESS.

Pyroxyline (Hardwich).

Sulphuric acid 1·845	(fluid) 18 ounces.
Nitric acid 1·457	,, 6 ,,
Water	(fluid) 5 to 5½ ,,
Cotton-wool	300 grains.

Temperature 150° Fahr. Time of immersion, 10 minutes.

Iodised Collodion (for Negatives).

For Acid Pyro Developer.

Ether, s.g. ·725	10 fluid ounces.
Alcohol, s.g. ·805	4 ,,
Pyroxyline	120 grains.
Iodide of ammonium	30 ,,
,, cadmium	45 ,,
Alcohol ·830	4 fluid ounces.

Bromo-iodised Collodion (for Negatives).

Iron Developer.

Ether, s.g. ·725	10 fluid ounces.
Alcohol, s.g. ·805	5 ,,
Pyroxyline	120 grains.
Iodide of ammonium	40 ,,
,, cadmium	40 ,,
Bromide of ,,	20 ,,
Alcohol ·830	5 fluid ounces.

Bromo-iodised Collodion (for Positives or Ferrotypes).

Ether, s.g. ·725	10 fluid ounces.
Alcohol, s.g. ·805	5 ,,
Pyroxyline	100 grains.
Iodide of cadmium	50 ,,
Bromide of ammonium	25 ,,
Alcohol ·830	5 fluid ounces.

Note.—The iodides should be dissolved in the weaker spirit and the pyroxyline in the ether and stronger spirit, and the two solutions mixed.

The Nitrate Bath (for Negatives)

Nitrate of silver (recrystallised)	6 ounces.
Distilled water	80 fluid ounces.
Nitric acid (pure)	8 minims.

Saturate with iodide of silver, then filter.

This is best done by coating a plate with collodion and leaving it in the bath for some hours.

(For Positives or Ferrotypes.)

Nitrate of silver (recrystallised)	5½ ounces.
Distilled water	80 fluid ounces.
Nitric acid (pure)	½ drachm.

Saturate with iodide of silver and filter as above.

DEVELOPER.

For Negatives.

No. 1.	Ferrous sulphate	¼ ounce.
	Glacial acetic acid	½ ,,
	Alcohol	½ ,,
	Water	10 ounces.
No. 2.	Ammonio-sulphate of iron	75 grains.
	Glacial acetic acid	75 ,,
	Sulphate of copper	7 ,,
	Water	4 ounces.
	Alcohol	¼ ounce,

For Collodion Positives or Ferrotypes.

Ferrous sulphate	150 grains.
Glacial acetic acid	½ ounce.
Nitric acid	5 minims.
Alcohol	½ ounce.
Water	10 ounces.

Note.—By increasing the proportion of nitric acid and decreasing that of the acetic, the image will be more metallic in appearance.

NITRATE OF IRON DEVELOPER FOR POSITIVES.

Ferrous sulphate	1½ ounce.
Nitrate of baryta	1 ,,
Water	1 pint.
Alcohol	1 ounce.
Nitric acid	40 drops.

The insoluble sulphate of baryta which is formed must be filtered out.

FIXING SOLUTION FOR POSITIVES.

Cyanide of potassium	½ ounce.
Water	15 to 20 ounces.

FOR COLLODION TRANSFERS.

Pyrogallic acid	5 grains.
Citric acid	3 ,,
Acetic acid	20 minims.
Water	1 ounce.
Alcohol	20 minims.

PYROXYLINE FOR DRY-COLLODION PROCESSES.

FOR COLLODIO-BROMIDE OR UNWASHED EMULSION.

Nitric acid, s.g. 1·45	2 fluid ounces
Sulphuric acid, s.g. 1·845	4 ,,
Water	1 fluid ounce.
Cotton (cleaned and carded)	100 grains.
Temperature	150° Fahr.
Time of immersion	10 minutes.

FOR WASHED EMULSION.

Nitric acid, s.g. 1·45	2 fluid ounces.
Sulphuric acid, s.g. 1·845	3 ,,
White blotting-paper	145 grains.
Temperature	100° Fahr.
Time of immersion	30 minu

THE COLLODIO-BROMIDE PROCESS.

COLLODIO-BROMIDE EMULSION.

Ether, s.g. ·720	5 fluid ounces.
Alcohol, s.g. ·820	3 ,,
Pyroxyline	50 grains.
Bromide of cadmium and ammonium	80 ,,
or Bromide of zinc	76 ,,

Sensitise by adding to each ounce fifteen grains of nitrate of silver, dissolved in a few drops of water and one drachm of boiling alcohol. This is suitable for slow landscape work or for transparencies.

Washed Emulsion (for Landscapes).

No. 1.

Ether, s.g. ·720	4 fluid ounces.
Alcohol, s.g. ·820	2¾ ,,
Pyroxyline	40 grains.
Castile soap (dissolved in alcohol)	30 ,,
Bromide of ammonium and cadmium	84 ,,

Sensitise with one hundred grains of nitrate of silver dissolved in one ounce of boiling alcohol; and, after standing ten days, add a further twenty grains of silver dissolved as before in two drachms of alcohol.

No. 2 (rapid).

Ether, s.g. ·720	4 fluid ounces.
Alcohol, s.g. ·820	2½ ,,
Pyroxyline	40 grains.
Castile soap	30 ,,
Bromide of ammonium and cadmium	56 ,,

Sensitise with 125 grains of nitrate of silver, dissolved, as before, in one ounce of alcohol with the aid of heat. In twelve hours' time add thirty grains more of the double bromide of ammonium and cadmium dissolved in half an ounce of alcohol.

For Washed Emulsion (for Transparencies).

Ether, s.g. 720	5 fluid ounces.
Alcohol, s.g. ·820	3 ,,
Pyroxyline or papyroxyline	60 grains.
Bromide of cadmium and ammonium	100 ,,
or Bromide of zinc	96 ,,
Hydrochloric acid, s.g. 1·2	8 minims.

Sensitise with twenty grains of nitrate of silver to each ounce, dissolved in a minimum of water with two drachms of boiling alcohol. Allow to stand for two or three days.

N.B.—In the three last formulæ, the emulsion, after being allowed to ripen for the time stated, should be poured into a dish and allowed to become thoroughly dry. The mass of dry emulsion is then washed, to remove all the soluble salts, and is then again dried and redissolved in equal parts of ether and alcohol, at the rate of from twenty to twenty-four grains to the ounce of solvents.

DEVELOPING SOLUTIONS FOR COLLODION EMULSION.

Solution A.

Pyrogallic acid	96 grains.
Alcohol	1 fluid ounce.

SOLUTION B.

Bromide of potassium	10 grains.
Water	1 fluid ounce.

SOLUTION C.

Liquor ammoniæ, s.g. ·880	1 fluid drachm.
Water	15 fluid drachms.

OR D.

Carbonate of ammonium	120 grains.
Water	1 fluid ounce.

For each drachm of developer take, for a normal exposure, five minims of A, one or two minims of B, and one or two minims of C; or, if D be used, add the above quantities of A, B, and C, to one drachm of D. When the details of the image are out, add double the quantities of B and C.

WELLINGTON'S COLLODIO-BROMIDE EMULSION FORMULÆ.

Pyroxyline	30 grains.
Ether	12 drachms.
Alcohol	12 ,,

To bromise, add 30 grains bromide ammonium dissolved in 45 minims water, to which 4 drachms of alcohol are afterwards added; 50 grains of nitrate of silver dissolved in a drachm of water are then added. After washing and drying, the pellicle is dissolved in 1¾ ounces of ether and 1¼ ounces alcohol.

DEVELOPER.

No. 1.	Pyrogallic acid	1 ounce.
	Sulphite of soda	4 ounces.
	Water	18 ,,
No. 2.	Potassium carbonate	3 ounces.
	Sulphite of soda	2 ,,
	Water	18 ,,
No. 3.	Bromide ammonium	1 ounce.
	Water	10 ,,

Use equal parts of each without dilution.

NESBIT'S FORMULÆ.

Pyroxyline	60 grains.
Methylated alcohol	2⅜ ounces.
Ether	2¼ ,,
Bromide ammonium (in water 100 minims)	63 grains.
Alcohol	1 ounce.
Nitrate of silver	100 grains.
Water	60 minims.

After washing and drying, redissolve in alcohol 4 ounces, ether 4 ounces.

INTENSIFYING SOLUTIONS FOR COLLODION EMULSION.

Nitrate of silver	60 grains.
Citric acid	30 ,,
Nitric acid	30 minims.
Water	2 ounces.

To each drachm of a three-grain solution of pyrogallic acid add two or three minims of the above, and apply until sufficient density is attained.

GELATINE EMULSION PROCESSES.

W. K. BURTON'S FORMULA.

A.	Bromide of ammonium	260 grains.
	Iodide of potassium	20 ,,
	Gelatine (Nelson No. 1)	80 ,,
	Distilled water	10 ounces.
B.	Silver nitrate (dry)	200 grains.
C.	Silver nitrate	200 grains.
	Distilled water	1 ounce.

Converted to ammonio-nitrate.

D.	Gelatine, hard (dry)	600 grains.

BURBANK'S FORMULA.

Water	1 ounce.
Bromide of ammonium	15 to 20 grains

Or,

Bromide of potassium	18 to 25 grains.
Nitrate of silver, proportioned to the amount of bromide	25 to 30 grains.
Gelatine	30 to 40 ,,

CAPTAIN ABNEY'S FORMULA.

1.	Potassium bromide	10 grains.
2.	Ammonium bromide	140 ,,
3.	Nelson's No. 1 gelatine	30 ,,
4.	Silver nitrate	200 ,,
5.	Nelson's No. 1 gelatine	80 ,,
6.	Coignet's special	80 ,,

CHARLES BENNETT'S FORMULA.

Ammonium bromide	70 grains.
Silver nitrate	110 ,,
Gelatine	200 ,,
Distilled water	6 ounces.

DR. EDER'S AMMONIA FORMULA.

1. Potassium bromide	370 grains
Gelatine	520 to 700 ,,
Water	10½ ounces.
2. Silver nitrate	460 grains.
Water	10½ ounces.

Strong ammonia is added to No. 2 until the precipitate is just re dissolved.

DR. VAN MONCKHOVEN'S FORMULA.

1. Hydrobromic acid (sufficient to dissolve 150 grains of silver nitrate).	
Gelatine	40 grains.
Water	7 ounces.
2. Silver nitrate	150 grains.
Bicarbonate of soda	*q.s.* to precipitate the carbonate.
3. Gelatine	80 grains.
Water (hot)	7 ounces.

Nos. 2 and 3 are mixed and then No. 1 added, 150 grains of gelatine being finally introduced.

A. L. HENDERSON'S FORMULA.

Silver nitrate	120 grains.
Water	3 ounces.
Potassium carbonate	60 to 90 grains.
Water	3 ounces.
Potassium bromide	90 grains.
,, iodide	1 grain.
Gelatine	20 grains.

MISCELLANEOUS FORMULÆ.

THE 'DUSTING-ON' PROCESS.

No. 1.	Saturated solution of bichromate of ammonium	5 drachms.
	Honey	3 ,,
	Albumen	3 ,,
	Distilled water	20 to 30 ,,
No. 2.	Dextrine	½ ounce.
	Grape sugar	½ ,,
	Bichromate	½ ,,
	Water	½ pint.
No. 3.	Gum arabic	6 parts.
	Bichromate of potash	2·5 ,,
	Grape sugar	4 ,,
	Water	72 ,,

SILVERING MIRRORS (Martin's Method).

(*In employing the following formulæ, it should be well understood that the glass plate to be silvered must be scrupulously clean.*)

A. Nitrate of silver ..... 175 grains.
Distilled water ..... 10 ounces.

B. Nitrate of ammonium ..... 262 grains.
Distilled water ..... 10 ounces.

C. *Pure* caustic potash ..... 1 ounce (avoirdupois).
Distilled water ..... 10 ounces.

D. Pure sugar candy ..... ½ ounce (avoirdupois).
Distilled water ..... 5 ounces.

Dissolve and add—

Tartaric acid ..... 50 grains.

Boil in a flask for ten minutes, and when cool add—

Alcohol ..... 1 ounce.

Distilled water *quant. suff.* to make up to 10 ounces.

For use take equal parts of A and B. Mix together also equal parts of C and D, and mix in another measure. Then mix both these mixtures together in the silvering vessel, and suspend the mirror face downward in the solution.

INK FOR RUBBER STAMPS.

Aniline red (violet) ..... 90 grains.
Boiling distilled water ..... 1 ounce.
Glycerine ..... half a teaspoonful.
Treacle ..... half as much as glycerine.

TO RECOVER FOGGED PLATES.

Make a solution as follows:—

Chromic acid	30 grains.
Bromide of potassium	60 ,,
Water	10 ounces.

And immerse the plates for five minutes. Afterwards wash very thoroughly, and rear up to dry.

Or, instead of the above, make the following:—

Bichromate of potash	1 ounce.
Hydrobromic acid	2 drachms.
Water	10 ounces.

If hydrobromic cannot be obtained, use hydrochloric acid or a soluble bromide; in the last case a few drops of sulphuric acid being added to the solution. Use as before.

SOLUTION FOR MOUNTING PRINTS WITHOUT THEIR COCKLING.

Nelson's No. 1 photographic gelatine	4 ounces.
Water	16 ,,
Glycerine	1 ounce.
Methylated alcohol	5 ounces.

Dissolve the gelatine in the water, then add the glycerine, and lastly the spirit.

ENCAUSTIC PASTE.

Pure wax	500 parts.
Gum elemi	10 ,,
Benzole	200 ,,
Essence of lavender	300 ,,
Oil of spike	15 ,,

BACKING SHEETS FOR DRY PLATES.

Gelatine	1 part.
Water	2 parts.
Glycerine	1 part.
Indian ink	A small addition.

Make a paste, and coat strong paper; place the prepared material, face downwards, on waxed glass to set. Press to back of plate before putting into dark slide.

SENSITISING SOLUTION FOR CARBON TISSUE.

Bichromate of potash	1 ounce.
Water	20 to 30 ounces.
Liquor ammoniæ	20 minims.

A strong solution should be used for hard negatives and a more dilute one for soft negatives.

WAXING SOLUTION.

For Carbon Prints, or for Removing Collodion Films.

No. 1.	Beeswax	20 grains.
	Benzole rect. No. 1	4 ounces.

For Flexible Supports (Autotype).

No. 2.	Yellow resin	3 drachms.
	Yellow beeswax	1 drachm.
	Rectified spirits of turpentine	10 ounces.

ALBUMEN PROCESS FOR TRANSPARENCIES.

Iodised Albumen.

Albumen	10 ounces.
Liquor ammoniæ	½ drachm.
Iodide of ammonium	50 grains.
Bromide of ammonium	10 ,,

Silver Bath.

Water	10 ounces.
Nitrate silver	1 ounce.
Glacial acetic acid	1 ,,

Coat the glass with old iodised collodion and when it has set wash under the tap, drain, and coat with the albumen. When dry, sensitise for 1 minute, wash, and again dry.

Developer.

Pyrogallic acid	30 grains.
Citric acid	20 ,,
Water	10 ounces.

Use warm (120° Fahr.) and add 2 or 3 drops of a 20-grain solution of nitrate of silver per ounce at the time of using. Fix in a solution of hyposulphite of soda 4 ounces to the pint. Tone with gold if the colour is too brown.

LUBRICANT FOR BURNISHING PRINTS.

Castile soap	20 grains.
Alcohol	10 ounces.

BACKING FOR DRY PLATES TO PREVENT HALATION (Teape's).

Gum solution (ordinary office gum)	1 ounce.
Caramel	1 ,,
Burnt sienna, ground in water	2 ounces.
Mix and add alcohol	2 ,,

COLOUR FOR APPLYING TO BRIGHT MACHINERY PRIOR TO PHOTOGRAPHING IT.

Mix white lead with turpentine to the consistence of thin cream, with sufficient lamp-black to form a light slate colour, and then add one-sixth the bulk of japanners' gold size. Paint the machinery over with this. After the photograph has been taken, the colour can be quickly removed with a pledget of 'cotton waste' moistened with turpentine or benzoline.

RETOUCHING MEDIUM.

Pale resin	1 ounce.
Oil of turpentine	1 ,,
Oil of lavender	2 ounces.

TO PREVENT BLISTERS IN ALBUMEN PRINTS.

Before wetting the prints immerse them in methylated spirit, then wash and tone as usual.

TO REMOVE GELATINE NEGATIVES FROM THE GLASS.

Immerse the plate in water to which a few drops per ounce of hydrofluoric acid have been added. If the film expands, as most likely it will, immersion in spirit will bring it to its original dimensions.

PRINTING ON PLAIN PAPER.

Prepare the plain paper with

Ammonium chloride	60 to 80 grains.
Sodium citrate	100 ,,
Sodium chloride	20 to 30 ,,
Gelatine	10 ,,
Distilled water	10 ounces.
or, Ammonium chloride	100 grains.
Gelatine	10 ,,
Water	10 ounces.

The gelatine is first swelled in cold water and then dissolved in hot water, and the remaining components of the formula are added. The solution is filtered, and, when still warm, the paper floated upon it for three minutes.

The salted paper is sensitised upon a neutral 45-grain silver bath.

PLATINUM TONING BATH FOR PLAIN SILVER PRINTS.

Chloroplatinite of potassium	1 gramme.
Water	1 litre.
Nitric acid	5 to 10 drops.

INVISIBLE INK.

Chloride of cobalt	50 grains.
Distilled water	1 fluid ounce.
Glycerine	10 minims.

Dissolve the chloride of cobalt in the distilled water, and add the glycerine.

Writing executed with this ink is invisible on paper, but, on warming, the writing turns blue. On exposure to damp air it becomes invisible again.

SOLUTION FOR MAKING PAPER ADHERE TO METAL.

Tragacanth	30 grammes.
Gum arabic	120 ,,
Water	500 c. c.

To Clean Slimy Sponges.—Dissolve one ounce of fused chloride of calcium in eight ounces of water. Wet the sponge, then submerge it in the solution until the slimy substance disappears, after which wash in plain water.

Removal of Oil Stains.—Mix pipe-clay or fullers' earth with cold water to a paste, and apply some of it to the soiled spot, without friction, so as not to injure the design. After having remained there for about twelve hours, it is removed and the remains brushed off. The porous material, after the water has evaporated, soaks up at least a portion of the oil. If the stain does not disappear by one application, it is to be repeated.

To Dry a Gelatine Negative Quickly.—After being fixed and well washed lay the negative, face up, on a sheet of blotting-paper, and covering it with another sheet of blotting-paper, rub the hand all over the surface until the negative is surface dry. Then place it in a current of air for a few minutes. A cambric handkerchief or soft towel will answer instead of blotting-paper. If the negative be immersed in alcohol it will absorb and displace the water in the film, and thus permit of a quick drying by the agency of heat if necessary.

Removing Rust from a Lens.—A lens sometimes acquires a brown, rusty stain on the surface, which no amount of rubbing or cleaning will remove. By applying a paste composed of putty powder and water to the stains, and then rubbing briskly with either the point of the finger or the side of the hand, every spot of rust or stain will be removed in a few minutes. This applies to photographic or other lenses, except the object glass of a telescope, which would be irreparably damaged by such treatment.

RATES OF POSTAGE FOR INLAND LETTERS.

THE rates of postage to be prepaid are as follow, viz. :—

For a letter not exceeding 1 oz.							1*d.*
,,	exceeding	1	oz., but not exceeding		2	ozs.	1½*d.*
,,	,,	2	,,	,,	4	,,	2*d.*
,,	,,	4	,,	,,	6	,,	2½*d.*
,,	,,	6	,,	,,	8	,,	3*d.*
,,	,,	8	,,	,,	10	,,	3½*d.*
,,	,,	10	,,	,,	12	,,	4*d.*
,,	,,	12	,,	,,	14	,,	4½*d.*

And so on at the rate of ½*d.* for every additional two ounces.

INLAND PARCEL POST.

EVERY Post Office is open to the public for Parcel Post business on Week Days during the same hours as for general postal business. On Sundays Parcel Post business is not transacted.

RATES OF POSTAGE AND WEIGHT.—Three-halfpence for each pound after the first, which is threepence.

PREPAYMENT OF POSTAGE.—All parcels must be prepaid. LIMITATION OF WEIGHT.—No Parcel exceeding 11 lbs. in weight can be received for transmission by Parcel Post. LIMITATION OF SIZE.—No Parcel may exceed 3 ft. 6 in. in length, or 6 ft. in length and girth combined. POSTING OF PARCELS.—Parcels must be handed in at a Post Office Counter, and must not be dropped into a Letter Box.

DEVELOPING VALUE OF THE ALKALIES.

Mr. W. B. Bolton's Table.

Caustic Soda.	Caustic Potash.	Ammonia NH_3.	Carbonate of Soda (anhydrous).	Carbonate of Soda (cryst.).	Carbonate of Potash (anhydrous).	Carbonate of Potash (cryst.).	Sesquicarbonate of Ammonia.
1	1·400	0·425	2·650	7·150	3·450	4·350	7·250
0·714	1·	0·304	1·893	5·170	2·464	3·107	5·178
2·353	3·294	1·	6·235	16·823	8·117	10·235	17·057
0·377	0·528	0·160	1·	2·698	1·301	1·641	2·736
0·140	0·196	0·059	0·370	1·	0·482	0·608	1·014
0·290	0·405	0·123	0·768	2·072	1·	1·261	2·101
0·230	0·322	0·098	0 609	1·644	0·793	1·	1·666
0·138	0·193	0·059	0·365	0·986	0·476	0·600	1·

CHEMICAL EQUIVALENCE OF THE ALKALIES.

Mr. G. E. Brown's Table.

Caustic Soda.	Caustic Potash.	Ammonia (·880 solution).	Carbonate of Soda (anhydrous).	Carbonate of Soda (cryst.).	Carbonate of Potash (anhydrous).	Carbonate of Potash (cryst.).	Sesquicarbonate of Ammonia.
80	112	97·14	106	286	138	174	12
1	1·400	·867	1·325	3·575	1·725	2·174	1·587
·714	*1*	1·211	·946	2·553	1·232	1·554	1·134
·834	1·153	*1*	1·091	2·944	1·421	1·791	1·307
·755	1·033	·916	*1*	2·698	1·302	1·641	1·198
·280	·392	·340	·371	*1*	·483	·608	·444
·580	·812	·704	·768	2·072	*1*	1·260	·920
·460	·644	·558	·609	1·644	·793	*1*	·730
·630	·882	·765	·835	2·252	1·087	1·370	*1*

DENSITY OF AQUEOUS SOLUTION OF AMMONIA AT 15°.

(LUNGE AND WIERNIK.

Specific Gravity.	NH_3 per Cent.	1 Litre contains NH g.	Correction of Sp. Gr. for ± 1
1·000	0·00	0·1	0·00018
0·898	0·45	4·5	0·00018
0·996	0·91	9·1	0·00019
0·994	1·37	13·6	0·00019
0·992	1·84	18·2	0·00020
0·990	2·31	22·9	0·00020
0·988	2·80	27·7	0·00021
0·986	3·30	32·5	0·00021
0·984	3·80	37·4	0·00022
0·982	4·30	42·2	0·00022
0·980	4·80	47·0	0·00023
0·978	5·30	51·8	0·00023
0·976	5·80	56·6	0·00024
0·974	6·30	61·4	0·00024
0·972	6·80	66·1	0·00025
0·970	7·31	70·9	0·00025
0·968	7·82	75·7	0·00026
0·966	8·33	80·5	0·00026
0·964	8·84	85·2	0·00027
0·962	9·35	89·9	0·00028
0·960	9·91	95·1	0·00029
0·958	10·47	100·3	0·00030
0·956	11·03	105·4	0·00031
0·954	11·60	110·7	0·00032
0·952	12·17	115·9	0·00033
0·950	12·74	121·0	0·00034
0·948	13·31	126·2	0·00035
0·946	13·18	131·3	0·00036
0·944	14·46	136·5	0·00037
0·942	15·04	141·7	0·00038

To REDUCE OVER-PRINTED PROOFS.—Immerse the prints in a solution composed of five grains of cyanide of potassium and five drops of liquor ammonia to a pint of water. Allow them to remain until a sufficient degree of reduction has been effected and then wash carefully.

To BLACKEN THE BRASS WORK OF LENSES.—The diaphragms of lenses ought not to be blackened by the dead-black varnish which is employed on the cells and the inside of a tube, as it would invariably chip off and produce a worse effect than if left untouched. They ought to be stained, by being first made quite clean and then receiving an application of a solution of nitrate of silver and nitrate of copper, heat being then applied.

DENSITY OF AQUEOUS SOLUTION OF AMMONIA AT 15°.—*Continued.*

(LUNGE AND WIERNIK.)

Specific Gravity.	NH_3 per Cent.	1 Litre contains NH_3 g.	Correction of Sp. Gr. for ± 1°.
0·940	15·63	146·9	0·00039
0·938	16·22	152·1	0·00040
0·936	16·82	157·4	0·00041
0·934	17·42	162·7	0·00041
0·932	18·03	168·1	0·00042
0·930	18·64	173·4	0·00042
0·928	19·25	178·6	0·00043
0·926	19·87	184·2	0·00044
0·924	20·49	189·3	0·00045
0·922	21·12	194·7	0·00046
0·920	21·75	200·1	0·00047
0·918	22·39	205·6	0·00048
0·916	22·03	210·9	0·00049
0·914	23·68	216·3	0·00050
0·912	24·33	221·9	0·00051
0·910	24·99	227·4	0·00052
0·908	25·65	232·9	0·00053
0·906	26·31	238·3	0·00054
0 904	26·98	243·9	0·00055
0·902	27·65	249·4	0·00056
0·900	28·33	255·0	0·00057
0·898	29·01	260·5	0·00058
0·896	29·69	266·0	0·00059
0·894	30·37	271·5	0·00060
0·892	31·05	277·0	0·00060
0·890	31·75	282·6	0·00061
0·888	32·50	288·6	0·00062
0·886	33·25	294·6	0·00063
0·884	34·10	301·4	0·00064
0·882	34·95	308·3	0·00065

TO PREPARE AN ILLUSTRATION FOR THE LANTERN.—A lecturer may prepare a diagram in a few minutes by coating thin glass or mica with benzole varnish to which a few drops of indiarubber solution have been added. This dries transparent, but allows of the finest writing being made on it by means of a steel pen and India ink. By placing it upon an engraving, the leading features may be quickly and accurately traced in outline.

TO MAKE INK FOR LABELS THAT WILL NOT BE AFFECTED BY ACIDS.—Make a mixture of one part pure Trinidad asphaltum, with four parts of oil of turpentine, coloured with plumbago.

TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

WITH a view of simplifying the calculations involved in emulsion-making, the late Mr. William Ackland a few years ago worked out some useful tables, which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidity the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognised style will find their labours materially lightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$.	Weight of *silver* haloid produced by one grain of *soluble* haloid.	Weight of *soluble* haloid required to produce one grain of *silver* haloid.	Weight of silver haloid produced from one grain $AgNO_3$.
Ammonium bromide	98	1·734	·576	1·918	·521	
Potassium ,, ...	119·1	1·427	·700	1·578	·633	
Sodium ,, ...	103	1·350	·606	1·325	·548	1·106
Cadmium ,, com.	172	·988	1·012	1·093	·915	
,, ,, anh.	136	1·25	·800	1·382	·723	
Zinc ,, ...	112·1	1·509	·663	1·670	·600	
Ammonium chloride	53·5	3·177	·315	2·682	·373	·844
Sodium ,, ...	58·5	2·906	·344	2·453	·408	
Ammonium iodide	145	1·172	·853	1·620	·617	
Potassium ,, ...	166·1	1·023	·977	1·415	·707	1·382
Sodium ,, ...	150	1·133	·882	1·566	·638	
Cadmium ,, ...	183	·929	1·076	1·284	·778	

The principal bromides, chlorides, and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No. I. presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows :—

Bromide of potassium	150 grains.
Iodide of potassium	10 ,,
Chloride of ammonium	10 ,,
Gelatine	200 ,,

Now we want to know how much silver nitrate should be employed in sensitising this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum :—

Potassium bromide	150 × 1·427 = 214	Weight silver nitrate required,
,, iodide	10 × 1·023 = 10·23	
Chloride of ammonium ...	10 × 3·177 = 31·77	

or the total quantity of silver nitrate required for full conversion, 256·00 grains.

No. II.

	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide. (Coml.)	Cadmium Bromide. (Anhyd.)	Zinc Bromide.	Ammonium Chloride.	Sodium Chloride.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.
Ammonium bromide.....	1	·823	·951	·57	·72	·87	1·832	1·675	·676	·59	·653	·535
Potassium ,, ...	1·215	1	1·156	·692	·876	1·058	2·226	2·036	·821	·717	·794	·651
Sodium ,, ...	1·051	·865	1	·599	·757	·915	1.925	1·761	·71	·62	·686	·563
Cadmium ,, com.	1·755	1·444	1·67	1	1·265	1·527	3·215	2·94	1·186	1·035	1·146	·94
,, ,, anh.	1·387	1·141	1·32	·79	1	1·207	2·542	2·324	·938	·819	·906	·743
Zinc ,, ...	1·149	·945	1·093	·655	·828	1	2·104	1·925	·776	·678	·75	·615
Ammonium chloride.....	·546	·449	·519	·311	·393	·475	1	·914	·369	·322	·356	·292
Sodium ,, ...	·597	·491	·568	·34	·43	·519	1·093	1	·403	·352	·39	·319
Ammonium iodide.....	1·479	1·217	1·408	·843	1·066	1·287	2·712	2·478	1	·873	·966	·792
Potassium ,, ...	1·695	1·394	1·612	·965	1·221	1·475	3·104	2·839	1·145	1	1·107	·907
Sodium ,, ...	1·53	1·259	1·456	·872	1·103	1·332	2·803	2·564	1·034	·903	1	·819
Cadmium ,, ...	1·867	1·536	1·776	1·064	1·345	1·625	3·42	3·128	1·262	1·102	1·22	1

TABLE No. II. gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in larger type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed 'Ammonium Bromide,' we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide we take the number in the same column which stands against the latter salt in the margin, viz., 1·215; that is to say, 1·215 grain of potassium bromide will be required to do the same work as one of NH_4Br.

SOLUBILITY OF THE SILVER HALOIDS.

By E. VALENTA.

In the *Royal Photographic Society's Journal* the following table, the result of a series of experiments, is given.

Solvent.	Concentration.	100 g. of solution can dissolve in grammes.			Remarks.
		Ag Cl.	Ag Br.	Ag I.	
Sodium hyposulphite	1 : 100	0·40	0·35	0·03	
,,	5 : 100	2·00	1·90	0·15	
,,	10 : 100	4·10	3·50	0·30	The estimations were made at 20° C.
,,	15 : 100	5·50	4·20	0·40	
,,	20 : 100	6·10	5·80	0·60	
Ammonium hyposulphite	1 : 100	0·57	—	—	For bromide and iodide of silver similar results were obtained as with sodium hyposulphite.
,,	5 : 100	1·32	—	—	
,,	10 : 100	3·92	—	—	
Sodium sulphite	10 : 100	0·44	0·04	0·01	
,,	20 : 100	0·95	0·08	0·02	
Ammonium sulphite	10 : 100		traces		
Ammonium carbonate	10 : 100	0·05	—	—	
Ammonia	3%	1·40	—	—	
,,	15%	7·58	—	—	
Magnesium chloride	50 : 100	0·50	—	—	
Potassium cyanide	5 : 100	2·75	6·55	8·23	25° C.
Ammonium sulphocyanide	5 : 100	0·08	0·21	0·02	
,,	10 : 100	0·54	2·04	0·08	23° C.
,,	15 : 100	2·88	5·30	0·13	
Potassium sulphocyanide	10 : 100	0·11	0·73	—	25° C.
Calcium sulphocyanide	10 : 100	0·15	0·53	0·03	
Barium sulphocyanide	10 : 100	0·20	0·35	0·02	
Aluminium sulphocyanide	10 : 100	2·02	4·50	0·02	
Thiocarbamide	10 : 100	0·83	1·87	0·79	25° C.
Thiosinamin	1 : 100	0·40	0·08	0·008	
,,	5 : 100	1·90	0·35	0·05	
,,	10 : 100	3·90	0·72	0·09	

TABLE OF THE SYMBOLS, ATOMIC AND EQUIVALENT WEIGHTS OF THE ELEMENTS.

Name.	Symbol.	Atomic Weight.	Equivalent Weight.
Aluminium	Al	27·02	9·007
Antimony	Sb	120·	40·
Arsenic	As	74·9	24·97
Barium	Ba	136·8	68·4
Beryllium	Be	9·08	4·54
Bismuth	Bi	208·	69·33
Boron	B	10·9	3·66
Bromine	Br	79·75	79·75
Cadmium	Cd	112·	56·
Cæsium	Cs	133·	132·7
Calcium	Ca	39·9	19·95
Carbon	C	11·97	2·99
Cerium	Ce	139·9	46·6
Chlorine	Cl	35·37	35·37
Chromium	Cr	52·4	26·2
Cobalt	Co	59·	29·5
Copper	Cu	63·2	31·6
Didymium	Di	143·	47·8
Erbium	E	165·9	55·3
Fluorine	F	19·1	19·1
Gallium	Ga	69·	23·
Gold	Au	197·	65·66
Hydrogen	H	1·	1·
Indium	In	113·4	37·8
Iodine	I	126·53	126·53
Iridium	Ir	192·5	48·125
Iron	Fe	55·9	27·95
Lanthanum	La	138·5	46·17
Lead	Pb	206·4	103·2
Lithium	Li	7·01	7·01
Magnesium	Mg	24·	12·
Manganese	Mn	55·	27·5
Mercury	Hg	199·8	99·9
Molybdenum	Mo	95·8	19·16
Nickel	Ni	58·6	29·3
Niobium	Nb	94·	31·33
Nitrogen	N	14·01	4·67
Osmium	Os	193·	24·125
Oxygen	O	15·96	7·98
Palladium	Pd	106·2	26·55
Phosphorus	P	30·96	10·32
Platinum	Pt	194·3	48·575

TABLE OF SYMBOLS, &c.—CONTINUED.

NAME.	Symbol.	Atomic Weight.	Equivalent Weight.
Potassium	K	39·04	39·04
Rhodium	Ro	104·	26·
Rubidium	Rb	85·2	85·2
Ruthenium	Ru	104·4	26·1
Selenium	Se	78·8	39·4
Silicon	Si	28·3	7·
Silver	Ag	107·66	107·66
Sodium	Na	23·	23·
Strontium	Sr	87·3	43·65
Sulphur	S	31·98	15·99
Tantalum	Ta	182·	60·67
Tellurium	Te	125·	62·5
Thallium	Tl	203·64	203·64
Thorium	Th	231·87	57·97
Tin	Sn	117·8	58·9
Titanium	Ti	48·0	12·
Tungsten	W	183·6	30·6
Uranium	U	240·	60·
Vanadium	V	51·2	17·07
Yttrium	Y	89·6	29·87
Zinc	Zn	65·2	32·6
Zirconium	Zr	90·	45·

FREEZING MIXTURES.

THE following mixtures will be found useful where ice is not readily obtainable—

	Ingredients.	Parts by Weight.	The Temperature at starting being 50° Fahr. the thermometer sinks.	Diminution of Temperature.
1	Water	1	From + 50° to + 4°	46° Fahr.
	Nitrate of ammonia	1		
2	Water	16	„ + 50° „ + 10°	40° „
	Saltpetre	5		
	Chloride of ammonium (sal ammoniac)	5		
3	Water	1	„ + 50° „ + 7°	43° „
	Nitrate of ammonia	1		
	Carbonate of soda	1		
4	Snow	2	„ 32° „ − 5°	37° „
	Chloride of sodium	1		
5	Snow	2	„ + 32° „ − 50°	82° „
	Crystallised chloride of calcium	3		
	Crystallised sulphate of soda	8	„ + 50° „ 0°	50° „
	Hydrochloric acid	5		

TABLE OF SYMBOLS OF THE MORE IMPORTANT COMPOUNDS USED IN PHOTOGRAPHY.

Name.	Symbol.	
Acid, Acetic (Cryst.)	$H, C_2 H_3 O_2$	60
,, Citric	$H_3, C_6 H_5 O_7 + H_2 O$	210
,, Formic	H, CHO_2	46
,, Gallic	$H, C_7 H_5 O_5$	170
,, Hydriodic	HI	128
,, Hydrobromic	$H Br$	81
,, Hydrochloric	$H Cl$	36·5
,, Hydrocyanic	$H CN$	27
,, Hydrosulphuric	$H_2 S$	34
,, Nitric	H, NO_3	63
,, Oxalic	$H_2 C_2 O_4 + 2 H_2 O$	126
,, Pyrogallic	$H_3 C_6 H_3 O_3$	126
,, Sulphuric	$H_2 SO_4$	98
,, Sulphurous	$H_2 SO_3$	82
,, Tannic	$H_4 C_{27} H_{18} O_{17}$	618
,, Tartaric	$H_4 C_4 H_2 O_6$	150
Alcohol, Methyl	$CH_4 O$	32
Alum, Chrome	$Cr K (SO_4)_2 12 H_2 O$	499·3
,, (Potash)	$Al K (SO_4)_2 12 H_2 O$	474·5
Amidol	$C_6 H_8 N_2 O$	17
Ammonium, Bichromate	$(NH_4)_2 Cr_2 O_7$	252
,, Bromide	$NH_4 Br$	98
,, Carbonate	$(NH_4)_2 CO_3$	96
,, Chloride	$NH_4 Cl$	53·5
,, Iodide	$NH_4 I$	145
,, Nitrate	NH_4, NO_3	80
,, Oxalate	$(NH_4)_2 C_2 O_4$	124
,, Sulphide of	NH_4, HS	51
,, Sulphocyanide of	NH_4, CNS	76
Barium, Bromide	$Ba Br_2$	297
,, Chloride (Cryst.)	$Ba, Cl_2 + 2 H_2 O$	244
,, Iodide	$Ba I_2$	391
,, Nitrate	$Ba, (NO_3)_2$	261
Benzole	$C_6 H_6$	78
Boracic Acid	$H_3 BO_3$	62
Cadmium, Bromide (Cryst.)	$Cd, Br_2 + 4 H_2 O$	344
,, Chloride	$Cd Cl_2$	183
,, Iodide	$Cd I_2$	366
Calcium, Bromide (Cryst.)	$Ca Br_2 + 4 H_2 O$	272
,, Chloride	$Ca Cl_2$	111
,, Iodide	$Ca I_2$	294
Camphor	$C_{10} H_{16} O$	152
Carbolic Acid	$C_6 H_6 O$	94
Copper, Bromide (cupric)	$Cu Br_2$	223·4
,, Chloride ,,	$Cu Cl_2 2 H_2 O$	170·4
,, Sulphate ,,	$Cu SO_4 5 H_2 O$	249·4

TABLES OF SYMBOLS, &c.—CONTINUED.

NAME.	SYMBOL.	
Dextrine	$C_6 H_{10} O_5$	162
Eikonogen	$C_6 H_{10} O_5$	261
Gold, Terchloride	$Au Cl_3$	302·5
Hydroquinone	$C_6 H_6 O_2$	110
Iridium, Perchloride	$Ir Cl_4$	335
Iron, Chloride (ferrous)	$Fe Cl_2$	127
„ „ (ferric)	$Fe_2 Cl_6$	325
„ Citrate	$Fe_2 (C_6 H_5 O_7)_2$	598
„ Iodide	$Fe I_2$	310
„ Oxalate (ferrous)	$Fe C_2 O_4$	144
„ „ (ferric)	$Fe_2 (C_2 O_4)_3$	376
„ Sulphate (ferrous)	$Fe SO_4 + 7 H_2 O$	278
„ „ (ferric)	$Fe_2 (SO_4)_3$	400
„ Ammonia-sulphate	$Fe SO_4, (NH_4)_2 SO_4 + 6 H_2 O$	392
Kaolin	$H_2 Al_2 Si_2 O_8 + H_2 O$	258·8
Lead, Acetate (Cryst.)	$Pb, (C_2 H_3 O_2)_2 + H_2 O$	343
„ Nitrate	$Pb, (NO_3)_2$	331
Lithium, Bromide	$Li Br$	87
„ Chloride	$Li Cl$	42·5
„ Iodide	$Li I$	134
Magnesium, Bromide	$Mg Br_2$	184
„ Chloride	$Mg Cl_2$	95
„ Iodide	$Mg I_2$	278
Mercury, Chloride (Mercuric)	$Hg Cl_2$	271
Metol	$C_8 H_{11} NO$	137
Nitrous Acid	$H NO_2$	63
Para-amidophenol	$C_6 H_7 NO$	109
Platinum, Chloride	$Pt Cl_4$	339·4
Potassium, Acetate	$K C_2 H_3 O_2$	98·1
„ Bichromate	$K_2 Cr_2 O_7$	294·6
„ Bromide	$K Br$	119·1
„ Carbonate	$K_2 CO_3$	138·2
„ Chloride	$K Cl$	74·6
„ Citrate	$K_3 C_6 H_5 O_7 + H_2 O$	324·2
„ Cyanide	$K C N$	65·1
„ Ferridcyanide	$K_6 Fe_2 Cy_{12}$	658·6
„ Ferrocyanide	$K_4 Fe Cy_6$	368·4
„ Hydrate	$K OH$	56·1
„ Iodide	$K I$	166·1
„ Nitrate	$K NO_3$	101·1
„ Oxalate	$K C_2 O_4 H_2 O$	235
„ Permanganate	$K_2 Mn_2 O_8$	316·2
„ Sulphocyanide	$K Cy S$	97
Salicylic Acid	$C_7 H_6 O_3$	138
Silver, Acetate	$Ag C_2 H_3 O_2$	167
„ Bromide	$Ag Br$	188
„ Carbonate	$Ag_2 CO_3$	276

TABLES OF SYMBOLS, &c.—Continued.

Name.	Symbol.	
Silver, Chloride	$Ag\,Cl$	143·5
,, Citrate	$Ag_3\,C_6H_5O_7$	513
,, Fluoride	$Ag\,Fl$	127
,, Iodide	$Ag\,I$	235
,, Nitrate	$Ag\,NO_3$	170
,, Oxalate	$Ag_2\,C_2\,O_4$	304
,, Oxide	$Ag_2\,O$	232
,, Sulphide	$Ag_2\,S$	248
Sodium, Acetate (Cryst.)	$Na\,C_2\,H_3\,O_2\,3\,H_2\,O$	136
,, Biborate (Borax)	$Na_2\,B_4\,O_7 + 10\,H_2\,O$	382
,, Bicarbonate	$Na\,H\,C\,O$	84
,, Bromide	$Na\,Br$	103
,, Carbonate (Cryst.)	$Na_2\,CO_3 + 10\,H_2\,O$	286
,, Chloride	$Na\,Cl$	58·5
,, Citrate	$2\,(Na_3\,C_6\,H_5\,O_7)\,11\,H_2\,O$	714
,, Hydrate	$Na\,H\,O$	40
,, Hyposulphite (Cryst.)	$Na_2\,S_2\,O_3 + 5\,H_2\,O$	248
,, Iodide	$Na\,I$	150
,, Sulphite	$Na_2\,SO_3\,7\,H_2\,O$	252
Strontium, Bromide	$Sr\,Br_2$	247·5
,, Chloride	$Sr\,Cl_2$	158·5
,, Iodide	$Sr\,I_2$	341·5
Thymol	$C_6\,H_3\,(C\,H_3)\,(C_3\,H_7)\,C\,O\,O$	177
Tin, Chloride (stannous)	$Sn\,Cl_2\,2\,H_2\,O$	225
,, ,, Stannic	$Sn\,Cl_4$	260
Uranium, Bromide	$U\,Br_2\,4\,H_2\,O$	352
,, Nitrate	$U_2\,O_2\,(NO_3)_2\,6\,H_2\,O$	504
Zinc, Bromide	$Zn\,Br_2$	225·2
,, Chloride	$Zn\,Cl_2$	136·2
,, Iodide	$Zn\,I_2$	319·2

To Ascertain the Strength of a Silver Solution.—If the solution contain nothing but nitrate of silver, then may the argento-hydrometer be employed in the certainty of its affording a fairly accurate idea of the number of grains of the salt contained in each ounce of water. But this specific-gravity test quite fails in the case of a silver solution which, from having been long in use, contains other matters. In this case a test solution, composed of pure chloride of sodium eight and a half grains, dissolved in six ounces of distilled water, must be prepared. To use it, place one drachm of the bath solution in a two-ounce bottle, rinsing out the minim measure with a drachm of distilled water and adding to the other. Pour in the salt solution slowly and with occasional shaking until no further precipitate takes place. Having noted how many drachms it has taken to effect this end, multiply this number by four for the weight in grains of the nitrate of silver present in an ounce of the bath solution. If pure chloride of sodium be not procurable, commercial chloride of ammonia may be substituted, seven and three-quarter grains being dissolved in six ounces of water.

TABLE OF THE SOLUBILITIES OF THE PRINCIPAL SUBSTANCES USED IN PHOTOGRAPHY.

	One part is soluble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling.		
Acid, Boracic (Anhydrous)	47·01	...	2·13	soluble
,, ,, (Cryst.)	25·66	3·0	3·9	sol. in 6 parts @ 60°
,, Citric	0·75	0·5	133·0	sol. in 1·15 pt. s. g. 820
,, Gallic	100·0	3·0	1·0	soluble in 4 parts
,, Oxalic	15·5	1·0	6·47	insoluble
,, Pyrogallic	2·25	...	...	sol. in alc. and ether
,, Salicylic	87·2	vry sol	0·35	easily soluble
,, Succinic	5·0	2·2	20·0	soluble in 3 parts
,, Tannic	very	soluble		sol. in alc. and ether
,, Tartaric	·66	·5	150·0	soluble
Alum (Potash)	10·5	vry sol	9·52	insoluble
,, (Ammonia)	7·32	,,	13·66	,,
Amidol	very	soluble		
Ammonium, Bromide	1·4	0·78	41·1	sol. in 32·3 parts
,, Carbonate	3·3	·833	33·0	insoluble
,, Chloride	2·7	1·00	37·02	sparingly soluble
,, Citrate	deliquescent		vy. sol.	less sol. in alcohol
,, Iodide	very	soluble		soluble
,, Nitrate	2·0	1·0	50·0	freely soluble
,, Oxalate	4·0	2·0	...	soluble
,, Salicylate	very	soluble		
,, Succinate	,,	,,		
,, Sulphocyanide	deliquescent		easily	sol. in water and alc.
Barium, Bromide	·96	...	104·2	easily soluble
,, Chloride { Crystallised	2·18	...	46·0	very slightly soluble
,, Chloride { Anhydrous.	2·862	...	34·1	
,, Iodide	0·48	0·35	208·3	easily soluble
,, Nitrate	12·2	2·84	8·18	
Cadmium, Bromide	easily	soluble		easily soluble
,, Chloride	0·71	0·67	...	,,
,, Iodide	1·08	0·75	92·6	very soluble
Calcium, Bromide (Cryst.)	0·97	...	102·56	easily soluble
,, Chloride	0·25	any qy	400·0	
,, Iodide	deliquescent			
Cobalt, Chloride	very	soluble		sol. in alc. and ether
Copper, Bromide (Cupric)	deliquescent		vy. sol.	,, ,,
,, Chloride ,,	,,	,,	,,	,, ,,
,, Nitrate	soluble		...	very soluble
,, Sulphate	2·5	...	40·0	insoluble
Eikonogen	40·0	vry sol	...	soluble
Gold, Perchloride	deliquescent		vy. sol.	soluble in ether

TABLE OF THE SOLUBILITIES, &c.—CONTINUED.

	One part is soluble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling.		
Iron, Chloride (Ferrous) { Anhyd.	2·0	...	50·0	sol. in 1 part alcohol
(Ferrous) { Hydrated	0·68	...	147·0	easily soluble
,, Chloride (Ferric)	very	del. &	sol.	very soluble
,, Oxalate ,,	insolu	ble, ex	cept in	excess of oxalic acid
,, Sulphate ,,	solubl	e	...	soluble
,, ,, (Ferrous)	1·3	·30	77·0	insoluble
Lead, Acetate	3·7	3·45	27·0	soluble in 12·5 parts
,, Nitrate	7·7	...	13·0	
Lithium, Bromide	0·66	...	149·8	soluble
,, Chloride	1·315	...	76·0	
,, Iodide	0·61	...	164·0	
Magnesium, Bromide	deliqu	escent	vy. sol.	very soluble
,, Chloride	1·857	...	53·8	
,, Iodide	deliqu	escent	vy. sol.	soluble
,, Sulphate	1·47	0·66	68·04	slightly soluble
Mercury, Chloride (Mercuric)	16·0	3·0	6·25	soluble in 2·35 parts
Platinum, Bichloride	solubl	e	...	easily sol. in alc. & ether
Potassium, Bichromate	10·0	...	10·0	
,, Bromide	1·55	...	64·5	
,, Carbonate	0·9	...	111·0	
,, Chloride	3·03	2·0	33·0	slightly soluble
,, Citrate	very	solubl	e	
,, Cyanide	deliqu	escent	vy. sol.	insol. in pure alcohol
,, Ferrocyanide	3·0	1·0	33·3	insoluble
,, Ferridcyanide	2·54	1·22	39·37	very sparingly soluble
,, Hydrate	0·5	...	200·0	very soluble
,, Iodide	0·7	0·27	143·0	sol. in 40 pts. abs. alc.
,, Nitrate	3·5	0·4	28·57	insoluble
,, Nitrite	deliqu	& solu	ble	
,, Oxalate(neutral)	3·0	...	33·3	slightly soluble
,, ,, (bin.)	40·0	...	2·5	insoluble
,, ,, (quad.)	20·17	...	4·95	insoluble
,, Permanganate	16·0	...	6·25	insoluble
,, Sulphocyanide				
Silver, Acetate	very	slightl	y sol.	
,, Citrate	solubl	e in wa	rm wate	r
,, Fluoride	deliqu	escent		
,, Nitrate	1·0	0·5	100·0	sol. in 4 pts. boiling alc.
,, Nitrite	300·0	dissol. easily	0·33	insoluble
,, Oxalate	spar'ly sol.	solubl	e	insoluble

TABLE OF THE SOLUBILITIES, &c.—CONTINUED.

	One part is soluble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling.		
Silver, Sulphate	200·0	88·0	0·5	insoluble
Sodium, Acetate (Cryst.)	2·86	·66	35·0	
,, Biborate (Borax)	12·44	2·0	8·033	insoluble
,, Bromide	1·13	...	88·5	
,, Carbonate (Cryst.)	2·0	1·0	50·0	insoluble
,, ,, (Anhyd.)	3·85	2·07	25·93	insoluble
,, Chloride	2·77	2·77	36·0	sparingly soluble
,, Citrate	1·0	...	100·0	sparingly soluble
,, Hydrate	1·65	...	60·63	easily soluble
,, Hyposulphite ... (Thiosulphate)	deliquescent		vy. sol.	insoluble
,, Iodide	0·55	0·3	180·0	sparingly soluble
,, Nitrate	1·136	...	88·03	sol. in 37 parts alc.
,, Nitrite	deliquescent		vy. sol.	very soluble
,, Phosphate	4·0	2·0	25·0	
,, Succinate	very soluble			
,, Sulphate	2·08	0·41	48·0	soluble
,, Sulphite	4·0	...	25·0	slightly soluble
,, Bisulphite	very soluble		...	insoluble
,, Sulphocyanide				
,, Tartrate	1·75	...	56·37	insoluble
,, Tungstate	4·0	2·0	25·0	
Strontium, Bromide	1·01	...	99·0	sparingly soluble
,, Chloride	1·88	...	53·0	feebly soluble
,, Iodide	0·56	0·27	178·5	
Uranium, Bromide (Hydrated)...	deliquescent & soluble			soluble
,, Nitrate	0·5	...	200·0	sol. in alc. and ether
,, Oxalate	nearly insol.	30·0	...	insoluble
Zinc, Bromide	deliquescent		vy. sol.	very soluble
,, Chloride	0·333	...	300·0	very soluble
,, Iodide	vy. deliques.		& sol.	very soluble

Percentage of Real Ammonia in Solutions of different Densities at 14° Centigrade.—CARIUS.

Specific Gravity.	Percentage Ammonia.	Specific Gravity.	Percentage Ammonia.	Specific Gravity.	Percentage Ammonia.	Specific Gravity.	Percentage Ammonia.
0·8844	36·0	0·9052	27·0	0·9314	18·0	0·9631	9·0
0·8864	35·0	0·9078	26·0	0·9347	17·0	0·9670	8·0
0·8885	34·0	0·9106	25·0	0·9380	16·0	0·9709	7·0
0·8907	33·0	0·9133	24·0	0·9414	15·0	0·9749	6·0
0·8929	32·0	0·9162	23·0	0·9449	14·0	0·9790	5·0
0·8953	31·0	0·9191	22·0	0·9484	13·0	0·9831	4·0
0·8976	30·0	0·9221	21·0	0·9520	12·0	0·9873	3·0
0·9001	29·0	0·9251	20·0	0·9556	11·0	0·9915	2·0
0·9026	28·0	0·9283	19·0	0·9593	10·0	0·9959	1·0

THERMOMETRIC TABLES,

SHOWING THE ASSIMILATION OF THE THERMOMETERS IN USE THROUGHOUT THE WORLD.

Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80·0	212·0	49	39·2	120·2
99	79·2	210·0	48	38·4	118·4
98	78·4	208·4	47	37·6	116·6
97	77·6	206·6	46	36·8	114·8
96	76·8	204·8	45	36·0	113·0
95	76·0	203·0	44	35·2	111·2
94	75·2	201·2	43	34·8	109·4
93	74·4	199·4	42	33·6	107·6
92	73·6	197·6	41	32·8	105·8
91	72·8	195·8	40	32·0	104·0
90	72·0	194·0	39	31·2	102·2
89	71·2	192·2	38	30·4	100·4
88	70·4	190·4	37	29·6	98·6
87	69·6	188·6	36	28·8	96·8
86	68·8	186·8	35	28·0	95·0
85	68·0	185·0	34	27·2	93·2
84	67·2	183·2	33	26·4	91·4
83	66·4	181·4	32	25·6	89·6
82	65·6	179·6	31	24·8	87·8
81	64·8	177·8	30	24·0	86·0
80	64·0	176 0	29	23·2	84·2
79	63·2	174·2	28	22·4	82·4
78	62·4	172·4	27	21·6	80·6
77	61·6	170·6	26	20·8	78·8
76	60·8	168·8	25	20·0	77·0
75	60·0	167·0	24	19·2	75·2
74	59·2	165·2	23	18·4	73·4
73	58·4	163·4	22	17·6	71·6
72	57·6	161·6	21	16·8	69·8
71	56·8	159·8	20	16·0	68·0
70	56·0	158·0	19	15·2	66·2
69	55·2	156·2	18	14·4	64·4
68	54·4	154·4	17	13·6	62·6
67	53·6	152·6	16	12·8	60·8
66	52·8	150·8	15	12·0	59·0
65	52·0	149·0	14	11·2	57·2
64	51·2	147·2	13	10·4	55·4
63	50·4	145·4	12	9·6	53·6
62	49·6	143·6	11	8·8	51·8
61	48·8	141·8	10	8·0	50·0
60	48·0	140·0	9	7·2	48·2
59	47·2	138·2	8	6·4	46·4
58	46·4	136·4	7	5·6	44·6
57	45·6	134·6	6	4·8	42·8
56	44·8	132·8	5	4·0	41·0
55	44·0	131·0	4	3·2	39·2
54	43·2	129·2	3	2·4	37·4
53	42·4	127·4	2	1·6	36·5
52	41·6	125·6	1	0·8	33·8
51	40·8	123·8	0	0·0	32·0
50	40·0	122·0			

TABLE SHOWING THE HOURLY VARIATION IN THE SUN'S POSI

CALCULAT

Mean Time	A.M. 5	6	7	8	9	10	
Jan. 1					41°E.	29°E.	1
Feb. 1				59°E.	47	35	1
,, 20				63	50	36	2
Mar. 8			77°E.	65	52	37	2
,, 21			80	67	53	38	2
April 2		94°E.	82	69	55	40	2
,, 19	108°E.	97	85	72	58	41	2
May 8 4 A.M.	111	100	89	76	61	44	1
,, 27 125°E.	114	103	91	79	65	47	1
June 22 127°E.	116	106	95	82	68	51	1
July 18	115	104	93	81	67	51	1
Aug. 5	114	101	91	78	62	47	
,, 25		97	85	73	59	43	
Sept. 10		92	80	67	54	38	
,, 23		88	77	64	50	35	
Oct. 6			73	60	46	31	
,, 22			69	57	44	29	
Nov. 9				53	40	27	
,, 22				52	39	25	
Dec. 22					40	27	

Calculated for latitud

To DEPOSIT GOLD UPON STEEL.—Make a solution of chloride of strength being immaterial, provided it be not too weak. We have preferred having as little water as possible. Into this solution pour ether, and, having replaced the stopper of the bottle, shake the mix up, when it will be found that the gold has left the water and ent combination with the ether. Upon immersing a piece of bright polishe such as the blade of a knife—in this, it will instantly become co metallic gold.

EGREES FROM THE SOUTH, AT DIFFERENT SEASONS OF THE YEAR.
C. BRANFILL.

on	P.M. 1	2	3	4	5	6	7	8
E.	13° W.	27° W.	40° W.					
	12	27	40	53° W.				
	13	29	44	57				
	15	31	46	61	73° W.			
	17	34	49	64	77	89° W.		
	20	39	54	69	81	92		
W.	22	42	58	73	85	97	108° W.	
	26	46	63	77	90	102	113	
W.	27	49	67	80	93	104	114	126° W.*
E.	27	49	67	81	94	105	115	127° W
	23	46	64	79	91	102	113	125
	22	44	61	75	88	100	111	
	21	41	58	72	85	97	108*	
W.	21	39	55	69	82	94		
	21	38	53	67	79			
	21	37	52	65	77			
	20	36	50	63				
	19	34	47	59				
	19	33	45					
W.	15	28	41					

—Bearings marked * are taken when the sun is below the horizon.

PREPARE OX-GALL FOR ARTISTIC OR SCIENTIFIC PURPOSES. — Procure a butcher half a pint of ox-gall. Place this in a clean saucepan and n ounce of powdered alum and an ounce of common salt. Place the fire, and when it boils remove for half an hour to cool; then again, and repeat this boiling and cooling for three or four times. this allow it to settle for three or four hours, and decant off into a , in which put two or three drops of essence of lemon. Cork and ve for use.

UNIVERSAL EXPOSURE TABLE.

By F. B. Taylor.

Exposure = A × B × C × D × E seconds.

Intermediate factors 3/8, 3/4, 3/2, 3, 6 for **f/10, f/14, f/20, &c.**

Factor.	A. Subject and Distance to Shadows.	B. Stop.	C. Light.	D. Altitude of Sun.	E. Plate
$\frac{1}{16}$	Clouds or distant mountains. **over ½ mile.**	f/4	Expose for the shadows. *Less* expo is required at high elevations, *e.g.* 5000 above sea level; and variations may be dicated by the colour of buildings or foli or lighting of interiors.		
$\frac{1}{8}$	Sea coast with sky or ships. **½ mile.**	f/5·6			
$\frac{1}{4}$	Open landscape, or distant view. No near foreground. **100 yards.**	f/8	Angle of view when p/f = ·5, 1, 1·5, 2. is 28°, 53°, 74°, 90°. Diff. for ·1, 6°, 5°, 4°, 3°.		**25 Wa** Extra ra Drop shut
$\frac{1}{2}$	Landscape with trees. **100 feet.**	f/11	Full sun light.	90° to 80°	**22 23 W** Rapid Go time
1	View with near buildings or trees. **40 feet.**	f/16	Bright diffused light.	70° to 54°	**20 W.** Instantan 30 time
2	Dark foliage in close foreground: Buildings in shade. **20 feet.**	f/22	Dull light.	36° to 27°	**17-18 W** Ordinar 15 time
4	Portrait out of doors: Copying same size. **10 feet.**	f/32	Very gloomy.	18° to 14°	**15 W** Slow. 10 time wet.
8	Under trees. Indoor portrait near large window.	f/45	Slight fog.	9° to 7°	**F. B. T** June, 1

For **portraits** in ordinary rooms × by **16**: For **interiors** read B × C × D × in **minutes**; reduce if well lighted or extensive.
For **enlargements or reductions** **n** times × by $(n+1)^2$. Distance of lens fr plate = $(n+1)\,f = n$ times distance of lens from original.

Index of definition $ad = 3f^2$, which is constant for each lens; stop **f/a**.
Focus on object at d yards, all beyond **d/2** yards is in focus.
Focus on distant object, all beyond **d** yards is in focus.

FORM OF NOTE-B

No.	Lens.	A. Subject. ¶ A, 40 ft. B, f/16. C, Bright, diffused. D, Sun 70°—54°. E, 20 W or 30 times. **Exposure 1 × 1 × 1 × 1 × 1 = 1 Sec.**	B. Stop.	L
	in.		f/	
	in.		f/	

orth 3 40 o 23	June 21.	May 22. July 22.	Apr. 21. Aug. 21.	Mar. 22. Sept. 21.	Feb. 20. Oct. 21.	Jan. 20. Nov. 21.	Dec. 21.	North 53 40 o 23
12 Noon	60 73 67 90	57 70 70 87	49 62 78 79	37 50 90 67	25 38 78 55	17 30 70 47	14 27 67 44	12 Noon.
A. M. P. M.	58 69 62 76	54 65 65 75	46 58 70 71	35 47 75 62	23 35 70 52	15 27 65 43	13 24 62 41	11 A. M. 1 P. M.
A. M. P. M.	52 60 52 63	49 57 54 62	41 50 57 59	31 41 60 52	20 30 57 44	12 23 54 37	9 20 52 34	10 A. M. 2 P. M.
A. M. P. M.	45 49 40 49	41 46 41 48	35 41 43 45	24 32 45 40	14 23 43 33	7 16 41 28	4 14 40 25	9 A. M. 3 P. M.
A. M. P. M.	37 38 27 36	33 35 27 34	27 30 28 31	17 22 30 27	7 13 28 21	0 8 27 17	. 5 27 15	8 A. M. 4 P. M.
A. M. P. M.	27 26 14 22	24 24 14 21	18 19 14 17	9 11 15 13	. 3 14 7	. . 14 4	. . 14 3	7 A. M. 5 P. M.
A. M. P. M.	18 15 0 7	15 12 0 6	8 7 0 3	0 0 0 0	. . 0 .	. . 0 .	. . 0 .	6 A. M. 6 P. M.
A. M. P. M.	10 4 . .	7 2 . .	Speed of plates.					
A. M. P. M.	2 . . .							
outh 3 40 o 23	Dec. 21.	Nov. 21. Jan. 20.	Oct. 21. Feb. 20.	Sept. 21. Mar. 22.	Aug. 21. Apr. 21.	July 22. May 22.	June 21.	South 53 40 o 23

USE WITH ABOVE.

Date, Hour, Sun's Alt.	E. Plate.	Factors. A.	B.	C.	D.	E.	Exposure. Due.	True.	Remarks.
: :									Developer.
: m.	W.								
: :									Developer.
: m.	W.								
:									Developer.

COLONEL STUART WORTLEY'S EXPOSURE TABLE.

THE following is an extract from an article, in a former ALMANAC, by the late Colonel Stuart Wortley:—

'I took the opportunity during my voyage into distant lands to make some careful tests of the different quality of the light in various places. These tests were made with two different kinds of actinometers, as well as by a special set of dry films made for the purpose, in order that I might compare the actual working of a plate with the scientific test of actinometry.

'I did not find that the light was so greatly superior in foreign countries as is generally supposed; and, putting the light of a very fine English day as 750, I found the power of light in various places to be as follows:—

At sea, 28 S. Pacific Ocean	1000
,, 42 S. Atlantic Ocean	970
Tahiti, in early morning	950
At sea, 16 S. Pacific Ocean	950
,, 21 N. ,,	900
In San Francisco harbour	870
On Rocky Mountains	850
Summit of Sierra Nevada	820
Virginia, Southern States of America	800
Sidney, Australia	800
Melbourne, ,,	800
Niagara Falls	780
England	750

'I will not trouble you with the light, that was worse than a good English day, beyond saying that the light at the Equator was comparatively poor in quality, though apparently very brilliant.'

RELATIVE EXPOSURES FOR VARYING PROPORTIONS OF IMAGE TO THE ORIGINAL.

[The following paper was read before the Royal Photographic Society by Mr. W. E. Debenham. Its usefulness would be diminished by abbreviation, hence we reproduce it in full.—ED.]

WHEN an enlarged photograph has to be made, either from a negative or print, it is commonly understood that the greater the degree of enlargement the longer will be the exposure required, but I have generally found only the vaguest ideas to exist as to the amount by which such exposure has to be prolonged. Sometimes, indeed, it is assumed that the exposure will be in direct inverse proportion to the area covered, so that a copy of twice the linear dimensions of the original—covering, as it does, the area of four times the size—would require an exposure of four times that sufficing for a copy of the same size. This calculation, however, omits to recognise an important factor, and leads to serious error; the actual exposure required in the case mentioned (assuming the same lens and stop to be used) being not four times, but two and a quarter times, that of a copy of same size; whilst, when we come to high degrees of enlargement, the error would amount to an indication of nearly four times the exposure actually required.

To find the relative exposure, add one to the number of times that the length of the original is contained in the length of the image, and square the sum. This will give the figure found in the third column of the annexed table.

Proportion of image to original (linear).	Distance of image from lens * in terms of principal focus.	Proportionate exposures.	Exposures proportioned to that required for copying same size.
$\frac{1}{30}$	$1\frac{1}{30}$	1·07	·27
$\frac{1}{20}$	$1\frac{1}{20}$	1·10	·28
$\frac{1}{10}$	$1\frac{1}{10}$	1·21	·3
$\frac{1}{8}$	$1\frac{1}{8}$	1·27	·31
$\frac{1}{6}$	$1\frac{1}{6}$	1·36	·34
$\frac{1}{4}$	$1\frac{1}{4}$	1·56	·39
$\frac{1}{2}$	$1\frac{1}{2}$	2·25	·56
$\frac{3}{4}$	$1\frac{3}{4}$	3·06	·76
(Same 1	2	4	1
size) 2	3	9	2·25
3	4	16	4
4	5	25	6·25
5	6	36	9
6	7	49	12·25
7	8	64	16
8	9	81	20·25
9	10	100	25
10	11	121	30·25
11	12	144	36
12	13	169	42·25
13	14	196	49
14	15	225	56·25
15	16	256	64
16	17	289	72·25
17	18	324	81
18	19	361	90·25
19	20	400	100
20	21	441	110·25
21	22	484	121
22	23	529	132·25
23	24	576	144
24	25	625	156·25
25	26	676	169
26	27	729	182·25
27	28	784	196
28	29	841	210·25
29	30	900	225
30	31	961	240·25

* With a double lens it is usually sufficient to measure from the position of the diaphragm plate.

As examples: suppose a copy is wanted having twice the linear dimensions of the original. Take the number 2, add 1 to it, and square the sum, $3^2=9$. Again, if a copy is to be of eight times the linear dimensions of the original, take the number 8, add 1, and square the sum, $9^2=81$. Copies respectively twice and eight times the size (linear) of the original will thus require relative exposures of 9 and 81—*i.e.*, the latter will require nine times the exposure of the former.

It is convenient to have a practical standard for unity. An image of the same size as the original is a familiar case, and serves as such standard. By dividing the figures in the third column by four, we get at the figures in the last column, which represent the exposure required for varying degrees of enlargement or reduction, compared with the exposure for a copy of the same size.

The table is carried up to enlargements of thirty diameters; that is about the amount required for enlarging a small *carte-de-visite* to life size.

The exposures required in reductions do not vary at all to the same extent that they do in enlargements. It has, therefore, not been thought necessary to fill in the steps between images of $\frac{1}{10}$ and $\frac{1}{20}$, and between $\frac{1}{20}$ and $\frac{1}{30}$ of the size of the original. Beyond $\frac{1}{30}$ there is scarcely any perceptible difference in the exposure until disturbance comes in from another cause, a considerable distance of illuminated atmosphere (haze or fog) intervening.

The figures in the second column will also serve as a table for distances from the lens to the plate and to the original, all that is necessary being to multiply by the principal focus of the lens in use. In the case of enlargements the figures less than 2 must be multiplied to get the distance from the original to the lens, and the figures greater than 2 for the distance from lens to image. For reductions, the figures less than 2, multiplied by the principal focus of the lens, yield the distance from lens to plate; and the figures higher than 2, similarly multiplied, give the distance of original from lens.

'UNIFORM SYSTEM' NUMBERS FOR STOPS FROM f TO $f/100$.

In the following table Mr. S. A. Warburton has calculated the exposure necessary with every stop from f to $f/100$ compared with the unit stop of the 'uniform system' of the Royal Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from f, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	f	U. S. No.	f	U. S. No.
1	$\frac{1}{16}$	15	14·06	58	210·25
$1\frac{1}{4}$	·097	16	16	59	217·56
1·414	$\frac{1}{8}$	17	18·06	60	225·00
$1\frac{1}{3}$	·140	18	20·25	61	232·56
$1\frac{2}{3}$	·191	19	22·56		240·25
2	$\frac{1}{4}$	20	25·00	63	248·06
$2\frac{1}{4}$	·316	21	27·56	64	256
$2\frac{1}{2}$	·390	22	30·25	65	264·06
2·828	$\frac{1}{2}$	22·62	32	66	272·25
$2\frac{3}{4}$	·472	23	33·06	67	280·56
3	·562	24	36·00	68	289·00
$3\frac{1}{4}$	·660	25	39·06	69	297·56
$3\frac{1}{2}$	·765	26	42·25	70	306·25
$3\frac{3}{4}$	·878	27	45·56	71	315·06
4	1·00	28	49·00	72	324·00
$4\frac{1}{4}$	1·12	29	52·56	73	333·06
$4\frac{1}{2}$	1·26	30	56·25	74	342·25
$4\frac{3}{4}$	1·41	31	60·06	75	351·56
5	1·56	32	64	76	361·00
$5\frac{1}{4}$	1·72	33	68·06	77	370·56
$5\frac{1}{2}$	1·89	34	72·25	78	380·25
5·656	2	35	76·56	79	390·06
$5\frac{3}{4}$	2·06	36	81·00	80	400·00
6	2·25	37	85·56	81	410·06
$6\frac{1}{4}$	2·44	38	90·25	82	420·25
$6\frac{1}{2}$	2·64	39	95·06	83	430·56
$6\frac{3}{4}$	2·84	40	100·00	84	440·00
7	3·06	41	105·06	85	451·56
$7\frac{1}{4}$	3·28	42	110·25	86	462·25
$7\frac{1}{2}$	3·51	43	115·56	87	473·06
$7\frac{3}{4}$	3·75	44	121·00	88	484·00
8	4	45	126·56	89	495·06
$8\frac{1}{4}$	4·25	45·25	128	90	506·25
$8\frac{1}{2}$	4·51	46	132·25	90·50	512
$8\frac{3}{4}$	4·78	47	138·06	91	517·56
9	5·06	48	144·00	92	529·00
$9\frac{1}{4}$	5·34	49	150·06	93	540·56
$9\frac{1}{2}$	5·64	50	156·25	94	552·25
$9\frac{3}{4}$	5·94	51	162·56	95	564·06
10	6·25	52	169·00	96	576·00
11	7·56	53	175·56	97	588·06
11·31	8	54	182·25	98	600·25
12	9·00	55	189·06	99	612·56
13	10·56	56	196·00	100	625·00
14	12·25	57	203·06		

THE ROYAL PHOTOGRAPHIC SOCIETY'S STANDARD DIAPHRAGMS.

THE annexed diagram and table are intended to facilitate the calculation of the proper number with which to mark the diaphragms according to the Royal Photographic Society of Great Britain's Uniform System, which will be found described on another page. This number is called the 'U. S.' (or uniform system number). The numbered circles in the diagram represent the sizes of stops. The photographer, knowing the equivalent focus of his lens, looks along the line opposite the number which represents the circle nearest inside to his diaphragm, and when he gets to the column headed by that equivalent focus the number there found is the U. S. number to be marked on the diaphragm. For example: a lens of eight inches equivalent focus has a diaphragm in size about No. 5 on the diaphragm; running the eye along the line opposite No. 5, we find in the column under—'focus eight inches' the number 11, which is the U. S. number required.



No. of Circle.	4 focus	5 focus	6 focus	7 focus	8 focus	9 focus	10 focus	12 focus	14 focus
1	25	39	56						
2	11	17	25	34	44	56	68		
3	6¼	10	14	19	25	31	40	56	
4	4	6¼	9	12	16	20	25	36	48
5	2¾	4¼	6¼	8⅓	11	14	17	25	34
6	2	3⅛	4½	6¼	8	10	13	18	25
7	1½	2⅛	3⅓	4¾	6	8	10	14	19
8	1¼	2	2¾	3¾	5	6¼	8	11	15
9	1	1½	2¼	3	4	5	6¼	9	12½
10		1	1⅓	2⅓	2¾	3⅛	4⅛	6	8⅓
11			1¼	1½	2	2½	3⅛	5	6
12			⅞	1⅛	1½	2	2½	3½	4¾
13				1	1¼	1⅝	1⅞	2¾	4
14					1	1¼	1⅓	2¼	3
15						1	1⅛	1⅞	2⅝
16							1	1½	2
17								1⅛	7⅞
18								1⅛	1½
19								1	1⅛
20									1⅛
21									1

TABLE FOR FINDING THE MINIMUM LENGTH OF STUDIO FOR A GIVEN LENS.

(*From the 'American Amateur Photographer.'*)

Distances in Inches from Object to Lens.

Equivalent Focus of Lens. In.	3 in. high.	4 in. high.	5 in. high.	6 in. high.	8 in. high.	10 in. high.	12 in. high.	16 in. high.	20 in. high.	24 in. high.	30 in. high.	36 in. high.	48 in. high.	54 in. high.	60 in. high.	72 in. high.
3	75	57														
4	100	76	61⅝	52												
5	125	95	77	65	50											
6	150	114	92⅝	78	60	49⅛										
8	200	152	123⅛	104	80	65 5/16	56									
10	250	190	154	130	100	82	70	55								
12	300	228	184⅛	156	120	98⅜	84	66	55⅛							
16	400	304	246⅜	208	161	131⅛	112	88	72⅝	64	54⅜	48				
20	500	380	308	260	200	164	140	110	90⅝	80	68	60	50	46⅜		
24	600	456	369⅜	312	240	196⅛	168	132	110⅝	96	81⅜	72	60	56	52⅛	48
30	750	540	462	390	300	246	210	165	136⅞	120	102	90	75	70	65	60
36	900	684	554⅜	463	360	307⅛	252	198	165⅜	144	122⅝	108	90	84	79⅛	72
48	1200	912	739⅛	624	480	393 1/5	336	264	220⅛	192	163⅕	144	120	112	105⅜	96
60	1500	1080	1024	780	600	492	420	330	272⅛	240	204	180	150	140	132	120
72	1800	1368	1108⅛	936	720	614⅜	504	396	321⅛	288	244⅛	216	180	168	158⅜	144

Distances in Inches from Lens to Ground Glass.

Equivalent Focus of Lens. In.	3 in. high.	4 in. high.	5 in. high.	6 in. high.	8 in. high.	10 in. high.	12 in. high.	16 in. high.	20 in. high.	24 in. high.	30 in. high.	36 in. high.	48 in. high.	54 in. high.	60 in. high.	72 in. high.
3	3⅛	3⅛														
4	4⅛	4⅛	4 1/16	4⅛												
5	5 1/16	5 1/16	5⅛	5 1/16	5⅛											
6	6⅛	6 1/16	6⅛	6⅛	6⅛	7⅛										
8	8⅛	8⅛	8⅛	8⅛	8⅛	9⅛	9⅛									
10	10 1/16	10⅛	10⅛	10⅛	11⅛	11 1/16	11⅛	12⅛								
12	12⅛	12⅛	12⅛	13	13⅛	13⅛	14	14⅛	15⅛							
16	16⅛	16⅛	17⅛	17⅛	17⅛	18⅛	18⅛	19⅛	20⅛	21⅛	22⅛	24				
20	20⅛	21⅛	21 7/16	21⅛	22⅛	22⅛	23⅛	24⅛	25 1/16	26⅛	28⅛	30	33⅛	35		
24	25	25⅛	25⅛	26	26⅛	26⅛	28	29⅛	30⅛	32	34	36	40	4	44	48
30	31⅛	31⅛	32 1/16	32⅛	33⅛	34⅛	35	36⅛	38⅛	40	42⅛	45	50	52⅛	55	60
36	37⅛	38	38⅛	39	39⅛	40	42	44	46	48	51	54	60	63	66	72
48	50	50⅛	51⅛	52	53⅛	54⅛	56	58⅛	61⅛	64	68	72	80	84	88	96
60	62⅛	63⅛	64⅛	65	66⅞	68⅛	70	73⅛	77⅛	80	85	90	100	105	110	120
72	75	76	77	78	79⅛	80	84	88	92	96	102	108	120	126	132	144

Suppose the lens used is 24 in. equivalent focus, and you wish to make a full-length portrait of a man 6 ft. high, in which the image will be 6 in. high. Look at the left-hand column for lens focus, and in the top line for size of image. At the intersection of these columns we find 312 in.= 26 ft., to be the distance the person must stand from the lens. In the next table, using the same lens and size of image as before, at the intersection of the columns we find 26 in., which represents the distance of the ground glass from lens centre. And in the same way any lens and size of image may be computed for.

CONTINENTAL STOPS AND THEIR U.S. EQUIVALENTS.

MR. EDWARD M. NELSON says: 'Photographers are frequently troubled by the Continental nomenclature of the stops, and wish to know the U.S. equivalents for them. The method of finding this out is very simple. All that is necessary is to divide f-4 by the ratio to be converted, and square the result. Example: Required the U.S. equivalent of f-9:—

$$\frac{f}{4} \div \frac{f}{9} = \frac{f}{4} \times \frac{9}{f} = 2{\cdot}25;$$

the square of 2·25 is 5·06, the U.S. number required. The following is a table of the Continental stops more commonly met with, and also the Continental values of the U.S. ratios:—

Ratios. f divided by	Continental Values.	U.S. Values.	Ratios. f divided by	U.S. Values.	Continental Values.
4·5	512	1·26	2·828	·5	1250
6·3	256	2·48	4	1	625
7	204	3·06	5·66	2	312
7·2	193	3·24	8	4	156
7·7	168	3·71	11·31	8	78
9	128	5·06	16	16	39
12·5	64	9·77	22·6	32	20
14·5	47	13	32	64	9·77
18	32	20	45·3	128	4·88
25	16	39	64	256	2·44
36	8	81	90·5	512	1·22
50	4	156	...	...	...
71	2	315	...	...	...
100	1	625	...	...	...

'To find the f ratio for the U.S. values, multiply the U.S. value by 16, and the square root of the product is the required ratio. Example: What is the ratio of U.S.-32? 32 multiplied by 16 is 512, the square root of this is 22·6, the ratio required.

'To find the f ratio for the Continental stops, multiply the reciprocal of the square root of the Continental value by 100. Example: What is the f ratio of the Continental value 16? The square root of 16 is 4, the reciprocal of 4 is ·25, which, multiplied by 100, is 25, the ratio required.

'*Note.*—The Continental ratios of 512, 256, and 8, ought to be 4·4, 6·25, and 35, respectively. The figures in the list are those extracted from Continental opticians' catalogues.'

TABLE SHOWING DISPLACEMENT ON GROUND GLASS OF OBJECTS IN MOTION.

By Henry L. Tolman.

From the 'Photographic Times.'

Lens 6 Inches Equivalent Focus, Ground Glass at Principal Focus of Lens.

Miles per hour.	Feet per second.	Distance on Ground Glass, in Inches, with Object 30 Feet away.	Same with Object 60 Feet away.	Same with Object 120 Feet away.
1	1½	·29	·15	·073
2	3	·59	·29	·147
3	4½	·88	·44	·220
4	6	1·17	·59	·293
5	7½	1·47	·73	·367
6	9	1·76	·88	·440
7	10½	2·05	1·03	·513
8	12	2·35	1·17	·587
9	13	2·64	1·32	·660
10	14½	2·93	1·47	·733
11	16	3·23	1·61	·807
12	17½	3·52	1·76	·880
13	19	3·81	1·91	·953
14	20½	4·11	2·05	1·027
15	22	4·40	2·20	1·100
20	29	5·87	2·93	1·467
25	37	7·33	3·67	1·833
30	44	8·80	4·40	2·200
35	51	10·27	5·13	2·567
40	59	11·73	5·97	2·933
45	66	13·20	6·60	3·300
50	73	14·67	7·33	3 667
55	80	16·13	8·06	4·033
60	88	17·60	8·80	4·400
75	110	22·00	11·00	5·500
100	147	29·33	14·67	7·333
125	183	36·67	18·33	9·167
150	220	44·00	22·00	11·000

THE ROYAL PHOTOGRAPHIC SOCIETY'S STANDARDS.

[The following is reprinted from the Society's *Journal*.]

THE Standards adopted by the Society in 1881 have been carefully reconsidered to see what additions or modifications were desirable.

The following statement is complete so far as the subjects it deals with are concerned:—

LENS DIAPHRAGMS.

It is recommended:—

1st. That the aperture of the standard-unit diaphragm have a diameter equal to one-fourth the equivalent focal length of the lens.

2nd. That diaphragms with smaller openings have apertures diminishing in area to the extent of one-half from the unit standard downwards.

3rd. That every diaphragm be marked with its intensity ratio, and also with the relation that the diameter of its aperture bears to the equivalent focal length of the lens, thus:—

$$\frac{f}{4};\ 2\,\frac{f}{5{\cdot}6};\ 4\,\frac{f}{8};\ 8\,\frac{f}{11{\cdot}3};\ 16\,\frac{f}{16};\ 32\,\frac{f}{22{\cdot}6};\ 64\,\frac{f}{32};\ 128\,\frac{f}{45{\cdot}2};\ 256\,\frac{f}{64};\ \&c.$$

Should a lens not admit of a diaphragm with an aperture as large in diameter as one-fourth its focal length, nor exactly any one of the above-mentioned sizes, it is still recommended that all the apertures be made in uniformity with the above scale, with the exception of the largest, which should be marked with the number its area requires in relation to the unit diaphragm. In the case of a lens having a working aperture exceeding in diameter one-fourth its focal length, the diaphragms should be marked according to the sizes of their relative apertures: for example:—

$$0{\cdot}5\,\frac{f}{2{\cdot}8};\ 0{\cdot}25\,\frac{f}{2},\ \&c.$$

And diaphragms which require to be made with apertures intermediate to the standard sizes should be marked in a corresponding manner.

LENS MOUNTS AND FITTINGS.

It is recommended:—

1st. That the equivalent focal length of each lens be engraved upon its mount.

2nd. That the following series of screws for photographic lens flange fittings be adopted:—

Diameter in Inches.	No. of Threads per Inch.	Core Diameter in Inches.
1	24	·9466
1·25	24	1·1966
1·5	24	1·4466
1·75	24	1·6966
2	24	1·9466
2·25	24	2·1966
2·5	24	2·4466
3	24	2·9466
3·5	12	3·3933
4	12	3·8933
5	12	4·8933
And upwards, advancing by inches.	12	

The form of thread is that known as Whitworth's Angular Thread, and is designed as follows:—Two parallel lines, at a distance apart equal to 0·96 of the screw pitch, are intersected by lines inclined to each other at 55°. One-sixth of the vertical height of the triangular spaces so obtained is rounded off both at the top and bottom. The depth of this thread is 0·64 of the screw pitch.

3rd. That every flange and adapter have a mark upon its front to indicate the position of the diaphragm slot or index of any lens when screwed home. The mark on any adapter should coincide with the mark upon any flange into which it is screwed. This mark should be placed at the point at which the thread becomes complete at the shoulder of the flange or adapter.

Camera Screws.

It is recommended:—

That all screws fitted to cameras, either for attachment to the stand, for fixing rising fronts, or for other movable parts, be either $\frac{3}{16}$, $\frac{1}{4}$, $\frac{1}{16}$, or $\frac{3}{8}$ of an inch in external diameter, and in pitch of thread and other details in accordance with the generally recognised Whitworth standards for these sizes.

Focus of Lens, inches.	TIMES OF ENLARGEMENT AND REDUCTION.							
	1 inches.	2 inches.	3 inches.	4 inches.	5 inches.	6 inches.	7 inches.	8 inches.
2	4 4	6 3	8 2⅔	10 2½	12 2⅖	14 2⅓	16 2⅐	18 2¼
2½	5 5	7½ 3¾	10 3⅓	12½ 3⅕	15 3	17½ 2 11/12	20 2⅞	22½ 2 1/16
3	6 6	9 4½	12 4	15 3¾	18 3⅗	21 3½	24 3⅐	27 3⅜
3½	7 7	10½ 5¼	14 4⅔	17½ 4⅜	21 4⅕	24½ 4 1/12	28 4	31½ 3 15/16
4	8 8	12 6	16 5⅓	20 5	24 4⅘	28 4⅔	32 4⅐	36 4½
4½	9 9	13½ 6¾	18 6	22½ 5⅝	27 5⅖	31½ 5¼	36 5⅐	40½ 5 1/16
5	10 10	15 7½	20 6⅔	25 6¼	30 6	35 5⅚	40 5⅐	45 5⅝
5½	11 11	16½ 8¼	22 7⅓	27½ 6⅞	33 6⅗	38½ 6 5/12	44 6⅐	49½ 6 3/16
6	12 12	18 9	24 8	30 7½	36 7⅕	42 7	48 6⅐	54 6¾
7	14 14	21 10½	28 9⅓	35 8¾	42 8⅖	49 8⅛	56 8	63 7⅞
8	16 16	24 12	32 10⅔	40 10	48 9⅗	56 9⅓	64 9⅐	72 9
9	18 18	27 13½	36 12	45 11¼	54 10⅘	63 10½	72 10⅐	81 10⅛

THE object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration:—A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must, therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at 30—7½. The greater of these is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for six in this column and multiply by 2, and so on with any other numbers.

TABLE OF VIEW-ANGLES.

By Clarence E. Woodman, Ph.D.

Divide the Base of the Plate by the Equivalent Focus of the Lens

If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is
	Degrees.		Degrees.		Degrees.
·282	16	·748	41	1·3	66
·3	17	·768	42	1·32	67
·317	18	·788	43	1·36	68
·335	19	·808	44	1·375	69
·353	20	·828	45	1·4	70
·37	21	·849	46	1·427	71
·389	22	·87	47	1·45	72
·407	23	·89	48	1·48	73
·425	24	·911	49	1·5	74
·443	25	·933	50	1·53	75
·462	26	·954	51	1·56	76
·48	27	·975	52	1·59	77
·5	28	1·	53	1·62	78
·517	29	1·02	54	1·649	79
·536	30	1·041	55	1·678	80
·555	31	1·063	56	1·7	81
·573	32	1·086	57	1·739	82
·592	33	1·108	58	1·769	83
·611	34	1·132	59	1·8	84
·631	35	1·155	60	1·833	85
·65	36	1·178	61	1·865	86
·67	37	1·2	62	1·898	87
·689	38	1·225	63	1·931	88
·708	39	1·25	64	1·965	89
·728	40	1·274	65	2·	90

Example.—Given a lens of 13 inches equivalent focus; required the angle included by it on plates respectively $3\frac{1}{4} \times 4\frac{1}{4}$, $4\frac{1}{4} \times 6\frac{1}{2}$, $6\frac{1}{2} \times 8\frac{1}{2}$, 8×10, 10×12, and 11×14.

1. Dividing 4·25 by 13, we have as quotient ·327—midway between the decimals ·317 and ·335 of our table; therefore the required angle is 18° 30′. Similarly—

						Degrees.
2.	6·5	÷ 13	=	·5;	corresponding to	28.
3.	8·5	÷ 13	=	·654;	,,	,, 36.
4.	10	÷ 13	=	·77;	,,	,, $42\frac{1}{2}$.
5.	12	÷ 13	=	·923	,,	,, $49\frac{1}{2}$.
6.	14	÷ 13	=	1·08	,,	,, 57.

Focus of Lens, inches.	TIMES OF ENLARGEMENT AND REDUCTION.							
	1 inches.	2 inches.	3 inches.	4 inches.	5 inches.	6 inches.	7 inches.	8 inches.
2	4 4	6 3	8 2⅔	10 2½	12 2⅖	14 2⅓	16 2⅐	18 2¼
2½	5 5	7½ 3¾	10 3⅓	12½ 3⅛	15 3	17½ 2 11/12	20 2⅔	22½ 2 1/16
3	6 6	9 4½	12 4	15 3¾	18 3⅗	21 3½	24 3⅐	27 3⅜
3½	7 7	10½ 5¼	14 4⅔	17½ 4⅜	21 4⅕	24½ 4 1/12	28 4	31½ 3 15/16
4	8 8	12 6	16 5⅓	20 5	24 4⅘	28 4⅔	32 4⅐	36 4½
4½	9 9	13½ 6¾	18 6	22½ 5⅝	27 5⅖	31½ 5¼	36 5⅐	40½ 5 1/16
5	10 10	15 7½	20 6⅔	25 6¼	30 6	35 5⅚	40 5⅐	45 5⅝
5½	11 11	16½ 8¼	22 7⅓	27½ 6⅞	33 6⅗	38½ 6 5/12	44 6⅓	49½ 6 3/16
6	12 12	18 9	24 8	30 7½	36 7⅕	42 7	48 6⅐	54 6¾
7	14 14	21 10½	28 9⅓	35 8¾	42 8⅖	49 8⅙	56 8	63 7⅞
8	16 16	24 12	32 10⅔	40 10	48 9⅗	56 9⅓	64 9⅐	72 9
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·37	21	·849	46	1·427	71
·389	22	·87	47	1·45	72
·407	23	·89	48	1·48	73
·425	24	·911	49	1·5	74
·443	25	·933	50	1·53	75
·462	26	·954	51	1·56	76
·48	27	·975	52	1·59	77
·5	28	1·	53	1·62	78
·517	29	1·02	54	1·649	79
·536	30	1·041	55	1·678	80
·555	31	1·063	56	1·7	81
·573	32	1·086	57	1·739	82
·592	33	1·108	58	1·769	83
·611	34	1·132	59	1·8	84
·631	35	1·155	60	1·833	85
·65	36	1·178	61	1·865	86
·67	37	1·2	62	1·898	87
·689	38	1·225	63	1·931	88
·708	39	1·25	64	1·965	89
·728	40	1·274	65	2·	90

Example.—Given a lens of 13 inches equivalent focus; required the angle included by it on plates respectively $3\frac{1}{4} \times 4\frac{1}{4}$, $4\frac{1}{4} \times 6\frac{1}{2}$, $6\frac{1}{2} \times 8\frac{1}{2}$, 8×10, 10×12, and 11×14.

1. Dividing 4·25 by 13, we have as quotient ·327—midway between the decimals ·317 and ·335 of our table; therefore the required angle is 18° 30′. Similarly—

						Degrees.
2.	6·5	÷ 13	=	·5;	corresponding to	28.
3.	8·5	÷ 13	=	·654;	,,	,, 36.
4.	10	÷ 13	=	·77;	,,	,, $42\frac{1}{2}$.
5.	12	÷ 13	=	·923	,,	,, $49\frac{1}{2}$.
6.	14	÷ 13	=	1·08	,,	,, 57.

Mr. E. M NELSON'S TABLE OF DISTANCES FOR LANTERN PROJECTION.

DISTANCE OF PROJECTION LENS FROM SCREEN, MASK BEING THREE INCHES.

Foci	4½	5	5½	6	7	8	9	10	11	12	14	15	16	18
Disc.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft.	ft. in.	ft. in.	ft. in.	ft. in.
5	7 10½	8 9	9 7½	10 6	12 3	14 0	15 9	17 6	19 3	21	24 6	26 3	28 0	31 6
6	9 4½	10 5	11 5½	12 6	14 7	16 8	18 9	20 10	22 11	25	29 2	31 3	33 4	37 6
7	10 10½	12 1	13 3½	14 6	16 11	19 4	21 9	24 2	26 7	29	33 10	36 3	38 8	43 6
8	12 4½	13 9	15 1½	16 6	19 3	22 0	24 9	27 6	30 3	33	38 6	41 3	44 0	49 6
9	13 10½	15 5	16 11½	18 6	21 7	24 8	27 9	30 10	33 11	37	43 2	46 3	49 4	55 6
10	15 4½	17 1	18 9½	20 6	23 11	27 4	30 9	34 2	37 7	41	47 10	51 3	54 8	61 6
11	16 10½	18 9	20 7½	22 6	26 3	30 0	33 9	37 6	41 3	45	52 6	56 3	60 0	67 6
12	18 4½	20 5	22 5½	24 6	28 7	32 8	36 9	40 10	44 11	49	57 2	61 3	65 4	73 6
13	19 10½	22 1	24 3½	26 6	30 11	35 4	39 9	44 2	48 7	53	61 10	66 3	70 8	79 6
14	21 4½	23 9	26 1½	28 6	33 3	38 0	42 9	47 6	52 3	57	66 6	71 3	76 0	85 6
15	22 10½	25 5	27 11½	30 6	35 7	40 8	45 9	50 10	55 11	61	71 2	76 3	81 4	91 6
16	24 4½	27 1	29 9½	32 6	37 11	43 4	48 9	54 2	59 7	65	75 10	81 3	86 8	97 6
18	27 4½	30 5	33 5½	36 6	42 7	48 8	54 9	60 10	66 11	73	85 2	91 3	97 4	109 6
20	30 4½	33 9	37 1½	40 6	47 3	54 0	60 9	67 6	74 3	81	94 6	101 3	108 0	121 6
25	37 10½	42 1	46 3½	50 6	58 11	67 4	75 9	84 2	92 7	101	117 10	126 3	134 8	151 6
30	45 4½	50 5	55 5½	60 6	70 7	80 8	90 9	100 10	110 11	121	141 2	151 3	161 4	181 6
35	52 10½	58 9	64 7½	70 6	82 3	94 0	105 0	117 6	129 3	141	164 6	176 3	188 0	211 6
40	60 4½	67 1	73 9½	80 6	93 11	107 4	120 9	134 2	147 7	161	187 10	201 3	214 8	241 6
45	67 10½	75 5	82 11½	90 6	105 7	120 8	135 9	150 10	165 11	181	211 2	226 3	241 4	271 6
50	75 4½	83 9	92 1½	100 6	117 3	134 0	150 9	167 6	184 3	201	234 6	251 3	268 0	301 6

TABLES OF DISTANCES AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS.

SIR D. SALOMON'S TABLE.

Focus of Lens in inches.	Ratios marked on Stops.													
	f/7	*f*/8	*f*/9	*f*/10	*f*/11	*f*/12	*f*/13	*f*/14	*f*/15	*f*/16	*f*/17	*f*/18	*f*/19	*f*/20
	Number of feet after which all is in focus.													
4	19	17	15	14	13	12	11	10	9	9	8	8	7	7
4½	21	19	17	15	14	12	11	11	10	10	9	9	8	7
4½	25	22	19	17	16	15	13	13	12	11	10	10	9	9
4¾	27	23	21	19	18	16	15	14	13	12	12	11	10	10
5	30	27	24	21	19	18	17	15	14	14	13	12	11	10
5½	33	29	25	23	21	20	18	17	16	15	14	13	13	12
5½	37	31	29	26	23	22	20	19	17	16	15	15	14	13
5¾	39	34	31	28	26	24	22	20	18	18	17	16	15	14
6	43	38	33	31	28	26	24	22	21	20	18	17	16	15
6½	47	41	37	33	30	28	26	24	22	20	20	19	18	17
6½	50	45	40	36	33	29	28	26	24	23	21	20	19	18
6¾	55	48	43	39	36	32	30	28	25	24	22	22	21	20
7	58	52	45	42	38	35	31	30	28	26	25	23	22	21

DR. J. J. HIGGINS'S TABLE.

Equivalent Focus.	*f*/5	*f*/6	*f*/7	*f*/8	*f*/9	*f*/10	*f*/11	*f*/12	*f*/13	*f*/14	*f*/15
5 inches	42	35	30	26	23	21	19	17½	16	15	14
5½ ,,	50½	42	36	32	28	25	23	21	19	18	17
6 ,,	60	50	43	38	34	30	27	25	23	21	20
6½ ,,	70½	59	50	44	39	35	32	29½	27	25	23½
7 ,,	82	68	59	51	45	41	39	34	31	29½	27

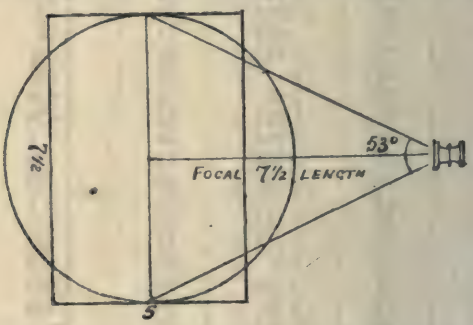
Calculated for a Confusion Disc of less than $\frac{1}{100}$ of an inch.

VIEW-ANGLES.

THE late Mr. M. J. Michael wrote us as follows :—

'I take this opportunity of drawing your attention to the "Table of View-angles," in THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC. If used as there directed, it leads to results inaccurate and misleading; inaccurate, since the angle included on a plate should be measured along the diagonal, and not along the base, of the plate; and the information is misleading, since it leads to the supposition that a lens having the angle which is given by using the table, as there directed, will cover the plate mentioned. Hence all the examples given at the foot of the table specify lenses that, if used on the given plates, must leave at least two, and if the lens is placed centrally, all the four, corners uncovered. If the corners of a plate are to be covered, the angle embraced by the lens must be sufficient to cover the diagonal of the plate; in other words, the circle of illumination given by the lens must have a diameter equal to the diagonal of the plate, and not only equal to the length of the base of the plate.

'A simple figure makes this evident. If the focal length of the lens, *e g.*, seven and a half inches on a $7\frac{1}{2} \times 5$ plate, is equal to the base of the plate, then, using the table as is directed, the quotient obtained is 1 and the angle 53°. From the figure, which is to scale, it is evident that,



arrange the plate as you will, at least two, and if placed centrally, all four, corners must be uncovered, *i.e.*, outside the circle of illumination.

'The table itself is correct when used as is usually directed by dividing the diagonal of any given plate by the focal length of the lens (see Dr. Eder, *Recepte und Tabellen*, fourth edition, page 94). If, therefore, the directions for using it were altered by substituting "diagonal of the plate" for the words, "base of the plate," the results obtained would be correct. It would save trouble if beneath the table were printed the length of the diagonals of the plates most commonly used :—

$3\frac{1}{4} \times 3\frac{1}{4}$	diagonal	4·6 inches.	$6\frac{1}{2} \times 8\frac{1}{2}$	diagonal	10·7 inches.
$3\frac{1}{4} \times 4\frac{1}{4}$	,,	5·3 ,,	8 × 10	,,	12·4 ,,
4 × 5	,,	6·4 ,,	10 × 12	,,	15·6 ,,
$4\frac{3}{4} \times 6\frac{1}{2}$	,,	8· ,,	12 × 15	,,	19·4 ,,
5 × $7\frac{1}{2}$	,,	9· ,,			

EQUATIONS RELATING TO FOCI, &c.

THE following simple optical formulæ and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes :—

Let p = Principal focus.
F = Greater conjugate do.
f = Lesser do. do.
$D = F + f$ = distance of image from object.
r = Ratio of any dimension in original to the same dimension in copy (in case of reduction), or *vice versâ* (in case of enlargement).
a = Effective diameter of diaphragm.
U. S. No. = 'Uniform System' No. of do.
x = Comparative exposure required.

Then

$$p = D \times \frac{r}{(r+1)^2} = \frac{Ff}{D} = \frac{F}{r+1} = \frac{rf}{r+1}$$

$$F = p(r+1) = \frac{pf}{f-p} = rf = \frac{rD}{r+1}$$

$$f = p \times \frac{(r+1)}{r} = \frac{pF}{F-p} = \frac{D}{r+1} = \frac{F}{r}$$

$$D = p \times \frac{(r+1)^2}{r} = f(r+1) = p\left(2 + r + \frac{1}{r}\right)$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$\text{U. S. No.} = \frac{p^2}{16\,a^2}$$

$$x = \frac{f^2}{16\,a^2} = \frac{p^2}{16\,a^2} \times \frac{(r+1)^2}{r^2}$$

N.B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

NOTE.—In case the above may not be clear to some photographers, the following rules may be better understood :—

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground-glass (D); next find the proportion which any dimension in the object bears to the same dimension on the ground-glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply D by r, and divide the product by the square of a number greater by one than r, or $(r+1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known) multiply p by the sum of $r+1$ and divide the product by r. Or divide D by $r+1$.

To find the greater conjugate focus (F) multiply p by $r+1$. Or multiply f by r.

To find D (the distance which the ground-glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F-p$ (the difference between F and p) by p. Or divide p by $f-p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example: focus an object which is five inches high, so that it is one inch high on the ground glass; thus we know that $r = 5$. Next measure the distance between the object and the ground glass (D), which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{2}$ inches.
$f = 6\frac{1}{2} \times 6 \div 5 = 7\frac{1}{5}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{2} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$D = 6\frac{1}{2} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{2} \times 7\frac{1}{2} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{2}) \div 6\frac{1}{2} = 5$. Or $r = 6\frac{1}{2} \div (7\frac{1}{2} - 6\frac{1}{2}) = 5$.

Mr. E. M NELSON'S TABLE OF DISTANCES FOR LANTERN PROJECTION.

DISTANCE OF PROJECTION LENS FROM SCREEN, MASK BEING THREE INCHES.

Foci	4½	5	5½	6	7	8	9	10	11	12	14	15	16	18
Disc.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft.	ft. in.	ft. in.	ft. in.	ft. in.
5	7 10½	8 9	9 7½	10 6	12 3	14 0	15 9	17 6	19 3	21	24 6	26 3	28 0	31 6
6	9 4½	10 5	11 5½	12 6	14 7	16 8	18 9	20 10	22 11	25	29 2	31 3	33 4	37 6
7	10 10½	12 1	13 3½	14 6	16 11	19 4	21 9	24 2	26 7	29	33 10	36 3	38 8	43 6
8	12 4½	13 9	15 1½	16 6	19 3	22 0	24 9	27 6	30 3	33	38 6	41 3	44 0	49 6
9	13 10½	15 5	16 11½	18 6	21 7	24 8	27 9	30 10	33 11	37	43 2	46 3	49 4	55 6
10	15 4½	17 1	18 9½	20 6	23 11	27 4	30 9	34 2	37 7	41	47 10	51 3	54 8	61 6
11	16 10½	18 9	20 7½	22 6	26 3	30 0	33 9	37 6	41 3	45	52 6	56 3	60 0	67 6
12	18 4½	20 5	22 5½	24 6	28 7	32 8	36 9	40 10	44 11	49	57 2	61 3	65 4	73 6
13	19 10½	22 1	24 3½	26 6	30 11	35 4	39 9	44 2	48 7	53	61 10	66 3	70 8	79 6
14	21 4½	23 9	26 1½	28 6	33 3	38 0	42 9	47 6	52 3	57	66 6	71 3	76 0	85 6
15	22 10½	25 5	27 11½	30 6	35 7	40 8	45 9	50 10	55 11	61	71 2	76 3	81 4	91 6
16	24 4½	27 1	29 9½	32 6	37 11	43 4	48 9	54 2	59 7	65	75 10	81 3	86 8	97 6
18	27 4½	30 5	33 5½	36 6	42 7	48 8	54 9	60 10	66 11	73	85 2	91 3	97 4	109 6
20	30 4½	33 9	37 1½	40 6	47 3	54 0	60 9	67 6	74 3	81	94 6	101 3	108 0	121 6
25	37 10½	42 1	46 3½	50 6	58 11	67 4	75 9	84 2	92 7	101	117 10	126 3	134 8	151 6
30	45 4½	50 5	55 5½	60 6	70 7	80 8	90 9	100 10	110 11	121	141 2	151 3	161 4	181 6
35	52 10½	58 9	64 7½	70 6	82 3	94 0	105 0	117 6	129 3	141	164 6	176 3	188 0	211 6
40	60 4½	67 1	73 9½	80 6	93 11	107 4	120 9	134 2	147 7	161	187 10	201 3	214 8	241 6
45	67 10½	75 5	82 11½	90 6	105 7	120 8	135 9	150 10	165 11	181	211 2	226 3	241 4	271 6
50	75 4½	83 9	92 1½	100 6	117 3	134 0	150 9	167 6	184 3	201	234 6	251 3	268 0	301 6

TABLES OF DISTANCES AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS.

SIR D. SALOMON'S TABLE.

Focus of Lens in inches.	Ratios marked on Stops.													
	f/7	*f*/8	*f*/9	*f*/10	*f*/11	*f*/12	*f*/13	*f*/14	*f*/15	*f*/16	*f*/17	*f*/18	*f*/19	*f*/20
	Number of feet after which all is in focus.													
4	19	17	15	14	13	12	11	10	9	9	8	8	7	7
4½	21	19	17	15	14	12	11	11	10	10	9	9	8	7
4½	25	22	19	17	16	15	13	13	12	11	10	10	9	9
4⅝	27	23	21	19	18	16	15	14	13	12	12	11	10	10
5	30	27	24	21	19	18	17	15	14	14	13	12	11	10
5½	33	29	25	23	21	20	18	17	16	15	14	13	13	12
5½	37	31	29	26	23	22	20	19	17	16	15	15	14	13
5⅝	39	34	31	28	26	24	22	20	18	18	17	16	15	14
6	43	38	33	31	28	26	24	22	21	20	18	17	16	15
6½	47	41	37	33	30	28	26	24	22	20	20	19	18	17
6½	50	45	40	36	33	29	28	26	24	23	21	20	19	18
6⅝	55	48	43	39	36	32	30	28	25	24	22	22	21	20
7	58	52	45	42	38	35	31	30	28	26	25	23	22	21

DR. J. J. HIGGINS'S TABLE.

Equivalent Focus.	*f*/5	*f*/6	*f*/7	*f*/8	*f*/9	*f*/10	*f*/11	*f*/12	*f*/13	*f*/14	*f*/15
5 inches	42	35	30	26	23	21	19	17½	16	15	14
5½ ,,	50½	42	36	32	28	25	23	21	19	18	17
6 ,,	60	50	43	38	34	30	27	25	23	21	20
6½ ,,	70½	59	50	44	39	35	32	29½	27	25	23½
7 ,,	82	68	59	51	45	41	39	34	31	29½	27

Calculated for a Confusion Disc of less than $\frac{1}{100}$ of an inch.

TABLE OF DISTANCES FOR AN OBJECT OF SIXTY-EIGHT INCHES HEIGHT.

COMPUTED BY P. BROSIC.

EQUIVALENT FOCUS (INCHES).	HEIGHTS OF IMAGES (INCHES).																	
	1	2	3	4	6	8	10	12	14	16	20	24	28	32	40	48	56	68
2	138·0 2·0	70·0 2·1	47.3 2·1	36·0 2·1														
3	207·0 3·0	105·0 3·1	71·0 3·1	54·0 3·2	37·0 3·3													
4	276·0 4·1	140·0 4·1	94·7 4·2	72·0 4·2	49·3 4·4	38·0 4·5					*Values are omitted in this space on account of the wide angle of lens required. (More than ninety degrees.)*							
5	345·0 5·1	175·0 5·1	118·3 5·2	90·0 5·3	61·7 5·4	47·5 5·6	39·0 5·7											
6	414·0 6·1	210·0 6·2	142·0 6·3	108·0 6·4	74·0 6·5	57·0 6·7	46·8 6·9	40·0 7·1	35·1 7·2									
7	483·0 7·1	245·0 7·2	165·7 7·3	126·0 7·4	86·3 7·6	66·5 7·8	54·6 8·0	46·7 8·2	41·0 8·4	36·7 8·6								
8	552·0 8·1	280·0 8·2	189·3 8·4	144·0 8·5	98·7 8·7	76·0 8·9	62·4 9·2	53·3 9·4	46·9 9·6	42 0 9·9	35 2 10·4							
9	621·0 9·1	315·0 9·3	213·0 9·4	162·0 9·5	111·0 9·8	85·5 10·1	70·2 10·3	60·0 10·6	52·7 10·9	47·2 11·1	39 6 11·6							
10	690·0 10·1	350·0 10·3	236·7 10·4	180·0 10·6	123·3 10·9	95·0 11·2	78·0 11·5	66·7 11·8	58·6 12·1	52·5 12·4	44·0 12·9	38·3 13·5	34·3 14·1					
11	759·0 11·2	385·0 11·3	260·3 11·5	198·0 11·6	135·7 12·0	104·5 12·3	85·8 12·6	73·3 12·9	64·4 13·3	57·7 13·6	48·4 14·2	42·3 14·9	37·7 15·5	34·4 16·2				
12	828·0 12·2	420·0 12·4	284·0 12·5	216·0 12·7	148·0 13·1	114·0 13·4	93·6 13·8	80·0 14 1	70·3 14·5	63·0 14·8	52·8 15·5	46·0 16·2	41·1 16·9	37·5 17 6				

									17·3	18·0	18·9	19·8	20·6	22·2			
16	1104 16·2	560·0 16·5	378·7 16·7	288 0 16·9	197·3 17·4	152·0 17·9	124·8 18·4	106·7 18·8	93·7 19·3	84·0 19·8	70·4 20·7	61·3 21·6	54·9 22·6	50·0 23·5	43·2 25·4	38·7 27·3	35 4 29·2	
18	1242 18·3	630·0 18·5	426·0 18·8	324·0 19·1	222·0 19·6	171·0 20·1	140·4 20·6	120·0 21 2	105·4 21·7	94·5 22·2	79·2 23·3	69·0 24·4	61·7 25 4	56·2 26·5	48·6 28·6	43 5 30·7	39·9 32·8	36·0 36·6
20	1380 20·3	700·0 20·6	473·3 20·9	360·0 21·2	246·7 21·8	190·0 22·4	156·0 22·9	133·3 23·5	117·1 24·1	105·0 24·7	88·0 25·9	76·7 27·1	68·6 28·2	62·5 29·4	54·0 31·8	48·3 34·1	44·3 36·5	40·0 40·0
22	1518 22·3	770·0 22·6	520·7 23·0	396·0 23·3	271·3 23·9	209·0 24·6	171·6 25·2	146·7 25·9	128·9 26·5	115·5 27·2	96·8 28·5	84·3 29·8	75 4 31 1	68·7 32·4	59·4 34·9	53·2 37·5	48·7 40·1	44·0 44·0
24	1656 24·4	840·0 24·7	568·0 25 1	432·0 25·4	296·0 26·1	228·0 26 8	187·2 27·5	160 0 28·2	140·6 28·9	126·0 29·6	105·6 31·1	92·0 32·5	82·3 33·9	75·0 35·3	64·8 38·1	58·0 40·9	53·1 43·8	48·0 48·0
26	1794 26·4	910·0 26·8	615·3 27·1	468·0 27·5	320·6 28·3	247·0 29·0	202 8 29·8	173·3 30·6	152·3 31·3	136·5 32·1	114·4 33·6	99·7 35·2	89·1 36·7	81·2 38·2	70·2 41·3	62·8 44·4	57·6 47·4	52·0 52·0
28	1932 28·4	980·0 28·8	662·7 29·2	504·0 29·6	345·3 30·5	266·0 31·3	218·4 32·1	186·7 32·9	164 0 33·8	147 0 34·6	123·2 36·2	107·3 37·9	96·0 39·5	87·5 41·2	75·6 44·5	67·7 47·8	62·0 51·1	56·0 56·0
32	2208 32·5	1120 32·9	757·3 33·4	576·0 33·9	394·7 34·8	304·0 35·8	249 6 36·7	213·3 37·6	187·4 38·6	168·0 39·5	140·8 41·4	122 7 43·3	109 7 45·2	100·0 47·1	86·4 50·8	77·3 54·6	70·9 58·4	64·0 64·0
36	2484 36·5	1260 37·1	852·0 37·6	648·0 38·1	444·0 39·2	342·0 40·2	280·8 41·3	240 0 42·4	210·9 43·4	189·0 44·5	158·4 46·6	138·0 48·7	123·4 50·8	112·5 52·9	97·2 57·2	87·0 61·4	79·7 65·6	72·0 72·0
44	3036 44·6	1540 45·3	1041 45·9	792·0 46·6	542·7 47·9	418·0 49·2	343·2 50·5	293·3 51·8	257·7 53·1	231·0 54·3	193·6 56·9	168·7 59·6	150·9 62·1	137·5 64 7	118 8 69·9	106·3 75·1	97·4 80·2	88·0 88·0
52	3588 52·8	1820 53·5	1231 54·3	936·0 55·1	641·3 56·6	494·0 58·1	405·6 59·6	346·7 61·2	304·6 62·7	273 0 64·2	228·8 67·3	199·3 70·4	178·3 73·4	162·5 76·5	140·4 82·6	125·7 88·7	115·1 94·8	104·0 104·0

This table gives, in inches, the distances from lens to object (greater conjugate focus, upper number) and from lens to ground glass (lesser conjugate focus, lower number) for different heights of images and different lengths of foci of lenses, when the height of object is 68 inches (=average height of man).

EXAMPLES.

Q.—What is the height of image of a person who is 133 inches distant from lens, when a lens of 14 inches focus is used?

A.—The height of image in this case is 8 inches.

Q.—What are the distances between object, lens, and ground glass if the image of a person is to be 8 inches high and a 14 inches focus lens is employed?

A.—The distance from object to lens will be 133 inches, from lens to ground glass 15·6 inches.

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South Kensington Museum.—Apply to the Secretary, Science and Art Department, London, S.W.

Bethnal Green Museum, E., for National Portraits.—Apply to the Curator, 20 Great George Street, Westminster, S.W. Objects belonging to the Science and Art Department same as for South Kensington.

Westminster Abbey.—A form of recommendation can be obtained from the Chapter Clerk, the Sanctuary, Westminster, S.W.; it has to be signed by a member of Parliament, of the Royal Academy, a barrister or clergyman, and then sent to the Chapter Clerk as above.

Tower of London.—From the Constable of the Tower.

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CONTENTS.

TITLE.	BY	PAGE
Acetylene in Photo-micrography	W. H. Walmsley	792
Aerial Focus	J. Leisk	780
Albumen Paper *v.* Gelatine	William Brooks	827
Albumen *versus* Gelatine	J. H. Baldock, F.C.S. ...	693
All Hallows', Barking	C. H. Crosby (Chicago) ...	829
Alum	S. E. Kelf	812
American Photographic Societies	... ...	613
Ammonia in Intensification	Chapman Jones	709
Animated Photography...	The Editor	643
Animated Photographs, Exhibiting	G. R. Baker	776
An Old Album	Mark Oute	692
Antiseptic in Photographic Operations, The Leading	Thomas Bolas, F.C.S., F.I.C.	755
Artificial Light, Photography by	R. J. Moss	815
Avec M. Jacques Crapaud	Wilford F. Field	736
Backed Plates, Drying and Cleaning	J. S. Teape	777
Backed Plates, The Influence of, Upon the Time of Exposure	Hector Maclean, F.G.S., F.R.P.S., &c....	739
Background, A Cheap	J. H. Wileman	814
Backgrounds	Edmond Wallis...	758
Boring and Turning Glass	Procella	673
Borrowed Children	James Reuel Smith	743
Brass Rackwork	R. T. Baxter	722
Bromide Enlarging, Zinc Dishes for	W. G. Stretton (Rangoon) ...	810
Bromide Paper, Success in Getting Warm Tones on	G. E. Brown, A.I.C.	717
Bromide Prints, Clearing	Harold Baker	767
'Buy Gum,' or the Advantages of the Gum Process	Frank M. Sutcliffe	686
Carbon Printing, A Few Remarks on	V. C. Baird	828
Carbon, Printing in	W. M. S.	760
Carbon Tissue Drying Box	Geo. W. Valentine	733
Celluloid Films and the Latent Image	R. P. Drage	798
Cinematograph Films, Developing	E. A. Robins	732
Collodion Lantern-slide Makers, Notes for... ...	W. B. Bolton	669
Colonial Photographic Societies	... ...	609
Colour Photography	... ...	637
Colour Photography, McDonough (Joly) Process of	Milton R. Punnett	807
Combination Dodge	T. Perkins	725
Combinations among Photographic Assistants ...	Arthur Field	749
Contact Copies of Lantern Slides without Unbinding—Reversing Negatives	F. H. Glew	679
Continental Photographic Societies	... ...	613
Contrasts, Modification of	Matthew Surface	708
Conversion of Grains and Ounces into Grammes ..	... ...	573
Conversion of Minims, Drachms, Ounces, and Pints to Cubic Centimetres and Litres... ...	... ...	573
Copper as a Developer	Edwin Banks	820
Copying	W. H. Wheeler...	681
Copying Photographs	G. Watmough Webster, F.C.S. F.R.P.S.	667
Copyright (Works of Art) Act (1862), The... ...	... ...	630
Cracked or Broken Negatives	Alfred I. Taylor	791
Curvature of Field, Astigmatism, &c., of Photographic Lenses	W. K. Burton	670
Dark Room Light	T. E. Huston (Cannelton, Ind., U.S.A.)	761
'De Minimis'	F. J. Mortimer	741
Developers for Rapid Plates	Alfred Watkins...	765
Developers, their Action and Use	W. Fenton-Jones	710
Dishes	H. Hands	772
Distortion Produced by Tilting the Camera, The Correction of	C. Welborne Piper	818

TITLE.	BY	PAGE
Egg Shell Used as a Parabolic Reflector	R. L. Maddox, Hon. Fellow R.M.S., Hon. Member Amer. M.S., &c.	731
Enlarging, A Device for Holding Paper when ...	Arthur Payne, F.C.S.	673
Enlarging by Daylight on Nikko and other Bromide Papers	J. H. Smith	696
Enlarging and Other Matters	'Hussar'	822
Enlargements for Home Decorative Purposes ...	William Fleming	790
Epitome of Progress in 1897	... ...	833
Exhibition, Cataloguing an	R. Child Bayley	802
Exhibition of 1897: An Impression	Redmond Barrett	768
Finders for the Hand Camera, Recent Improvements in	Dr. A. Clifford Mercer ...	813
Focussing Screen and its Substitutes	Rev. F. C. Lambert	781
French Fluid Measures	... ...	624
Gelatine versus Collodion Negatives	Charles Allan Ferneley ...	832
Gelatino-chloride P.O.P., Notes on the Working of	J. Barker	680
Halation and Backing	George T. Harris	719
Halation—Radiography—Acetylene, &c.	... ...	638
Half-tone Process, Some Notes on the	William Gamble	756
Hand-camera Notes	Henry V. Lawes	704
Hand Camera Once More	H. P. Robinson	747
Hand-camera Work, Notes on	Herbert S. Starnes	824
How many Litres are there in a Gallon?	Robert H. Bow, C.E., F.R.S.E.	668
How to Remove Sensitive Paper from a Negative to which it has Stuck Fast	J. T. Hackett	762
Index of Formulæ and Tables	... ...	961
Indian Wants	H. Manners	793
Indian Wants, A Few	Geo. Ewing (Calcutta) ...	762
Inland Parcel Post	... ...	1044
Intensifier, A Hint Regarding the Cyanide of Silver	H. J. Channon	825
Iron Solution, A Container for—Ferrous Oxalate Developer	W. Eaton Bragg	699
Keeping Qualities of Films	Harry Selby	771
Lantern Screen, The New Silver	John Anderton	788
Lantern-sized Negatives	Rev. B. Holland	695
Lantern Slides, Quality and Permanence in Gelatine	John A. Hodges	737
Lenses for Architectural Subjects	C. H. Bothamley	809
Lenses, Testing	P. Everitt	685
Lenses, The Testing of	A. Kapteyn	796
Lenses, The Testing of Modern	Philip Jourdain	769
L. S. D.	Frank Miall	684
Metal Sheaths, How to Make	John Ross	790
Metol or Pyrogallol	E. Dunmore	698
Metrical System, The	George Fernau	553
Micro-photography and the Polariscope	W. J. Bishop	820
Mounting P.O.P. and Other Prints	W. E. Leek	748
Music in the Service of Photography	H. O. Klein	744
Negatives and How to Make them	F. Dunsterville	675
Negatives by Post	S. Herbert Fry	783
Negatives with Clear Glass, Exposure Tables, and 'Reversals'	F. H. Varley	726
Obituary	... ...	639
Outdoor Work, Hints on	Thos. Stokoe	713
Packing Plates	Albert Levy	766
Paper Negatives	W. T. Wilkinson	707
Papers and Plates	Rev. J. Carter Browne, D.D.	697
Photo-cycling	James Stein	690
Photographer, some Dealers, and all Manufacturers	J. Vincent Elsden, B.Sc. ...	831
Photographers and their Clients	Thos. Fall	787
Photographic Copyright Union, The	... ...	625
Photographic Societies of the United Kingdom ...	... ...	574
Photographing Feelings	J. Rees	745
Photography for the Dilettanti	W. Hampson	759
Photography in the Tropics	Rev. J. W. Fall, M.A. ...	682
Photo-lecturing	T. N. Armstrong	790
Photometers, Actinometers, Exposure Meters, Exposure Tables, &c.	George Fernau	705
Plate-cutting Appliance, Handy	W. P. Wiseman	804
Plate-washer, A Zigzag	G. G. Mitchell	770
Platinotypes	Thomas Bailey	703

TITLE.	BY	PAGE
Practical Notes and Suggestions of the Year		883
Absorption		883
Adhesive for Fabrics and Metals		884
Albumenised Paper, A New		884
Aluminium as a Support for Collotype Plates		884
Alumtypie		884
Anti-halation Backing		885
Anti-halation Paper		885
Artigue's Paper		886
Artigue Process		886
Astigmatism, Testing a Lens for		886
Automatic Developer		887
Backing Mixture		887
Backing Plates		887
Backing Sheets		887
Blackening Aluminium		888
Blackening Brass		888
Blackening Iron and Steel		888
Blackening Wood		888
Blue Prints on Linen		888
Blue Tones on Celloidin Paper		889
Celloidin Paper, The Preparation of		889
Collodio-chloride Emulsion		890
Collodio-chloride Paper		890
Collodio chloride Prints, Unequal Toning of		890
Combined Gold and Platinum Toning		891
Copying Maps		893
Copying Prints, Drawings, &c.		892
Developers, Quick		902
Dry Developer		893
Fish Glue in the Gum-bichromate Process		893
Grainless Emulsion		893
Ground Glass		894
Halation		894
Halation and its Remedies		895
Halation, Preventives of		897
Lantern Plates, Home-made		898
Incandescent Light and Gas Chimneys		899
Intensification		899
Intensification, Mechanical		900
Iodine as an Accelerator in the Hydroquinone Developer		899
Labels on Glass		900
Lantern Slides, Warm Tones on		909
Lithographic Ink		900
Mercury Toning		900
Metol Developer without Alkali		900
Mounting		900
Photo-lithography, Direct		894
Photo Reliefs		901
Platinum and Gold Toning		901
Platinum Paper, Home made		902
Pyro-metol		902
Reproduction of Plans, Drawings, &c.		903
Reproductions of Drawings without a Camera		903
Reversed Negatives		904
Silvering Glass		905
Solubility of Silver Chloride in Ammonia		905
Stripping Films		905
Stripping Prints		905
Sensitiveness of the Retina to Light		904
Thiosinamine Toning		905
Three-colour Projection		906
Toning Gelatine Prints		906
Toning of Bromide Prints		906
Varnish for Collotypes		907
Varnish, Negative		901
Velox: an Ideal Printing Paper		908
Vignetting Glasses		908
Washing after Fixing		909
Yellow Screens		910

PRICE LIST, 1898,

. . . OF . . .

Thomas's Plates & Films,

ORDINARY or ISOCHROMATIC, In Three Rapidities.

WHITE LABELS:
MEDIUM ORDINARY.
EXTRA RAPID „
'A 1' „

YELLOW LABELS:
MEDIUM ISOCHROMATIC.
EXTRA RAPID „
'A 1' „

The EXTRA RAPID are three times and 'A 1' six times faster than the Medium.

PLATES, Ordinary or Isochromatic. Medium, Extra Rapid, 'A 1.'
AND TRANSPARENCY PLATES

INCHES.

3¼×3¼ & 4¼×3¼ 1/-	5×4 1/7	6½×3¼ & 6¾×3¼ 2/-	6½×4¼ 2/2	6½×4¾ 2/3	7¼×4½ 2/10	
7½×5 3/6	8×5 3/9	8½×6½ 4/3	9×7 5/-	10×8 7/3	12×10 10/6	15×12 18/-

CENTIMETRES.

8½×8½ & 8½×10 1/-	9×12 1/3	8½×17 2/-	12×16 2/3	12×16½ 2/3	13×18 2/9	
16×21 4/3	18×24 5/-	21×27 7/6	24×30 9/6	30×40 14/6	40×50 37/6	50×60 55/-

FILMS, Ordinary or Isochromatic. Medium, Extra Rapid, 'A 1.'
AND TRANSPARENCY PLATES (ON GROUND GLASS).

INCHES.

3¼×3¼ & 4¼×3¼ 1/6	5×4 2/6	6½×3¼ & 6¾×3¼ 3/-	6½×4¼ 3/-	6½×4¾ 3/8	7¼×4½ 5/-	
7½×5 5/-	8×5 5/-	8½×6½ 6/6	9×7 10/-	10×8 10/-	12×10 16/-	15×12 25/

CENTIMETRES.

8½×8½ & 8½×10 1/6	9×12 2/-	8½×17 3/-	12×16 3/8	12×16½ 3/8	13×18 4/3	
16×21 6/6	18×24 7/6	21×27 10/3	24×30 14/3	30×40 27/6	40×50 42/-	50×60 60/-

THOMAS'S Original **ANTI-HALATION PLATES** (Patent) in two speeds: 'Ultra Rapid' (Ordinary), and 'Medium' (Isochromatic). Same price as Films.

LARGE SIZES A SPECIALTY; PRICES ON APPLICATION.

R. W. THOMAS & Co., Limited,

Pall Mall Factory, THORNTON HEATH.

Telegrams: 'SPEED, THORNTON HEATH.' Telephone No. 65 (CROYDON).

[See preceding page.

FITCH & CO.,

The Original Manufacturers of

SENSITISED XYLONITE FILMS.

PRICE LIST.

Ordinary & Rapid.		Special Extra Rapid.
¼-Plate	1/9 per doz.	2/6 per doz.
5×4	3/- ,,	4/- ,,
6¾×3¼	3/3 ,,	4/6 ,,
½	4/- ,,	5/6 ,,
7½×5	6/- ,,	7/6 ,,

Ordinary & Rapid.		Special Extra Rapid.
½	7/- per doz.	10/- per doz.
10×8	12/- ,,	16/- ,,
12×10	17/6 ,,	22/- ,,
15×12	30/- ,,	38/- ,,

Special Extra Thick Film, as rigid as Glass, coated to order at double above Prices.

These Films are undoubtedly the most reliable in the Market, and we daily receive testimony to this effect from users of them.

PAUL LANGE, Esq., writes:—

'Your *quick* films have given very satisfactory results; quality as excellent as the ordinary emulsion, and speed as quick as any others tried by me. I therefore give you the preference.'

HUGH STANNUS, Esq., F.R.I.B.A., writes:—

'I was advised by Capt. Abney to take your films. I have every reason to be pleased with them.'

FITCH'S UNIVERSAL FILM CARRIERS.

The only perfect carrier for Films. Can be used in any dark slide. Consists of Cardboard with adhesive surface, to which the film adheres by pressure but is easily detachable.

¼-Plate	...	...	4/- per doz.
5×4	...	...	6/- ,,
½	...	...	9/- ,,
7½×5	...	...	12/- ,,

½-Plate	...	...	15/- per doz.
10×8	...	...	18/- ,,
12×10	...	...	30/- ,,

Any size to order.

CINEMATOGRAPH FILM.

In lengths of 75 ft. Negative or Positive. Width 35 mm., 18/6

PERFORATING EDISON GAUGE, per 75 ft., 1/6.

Prices of other widths on application.

SAMPLE 10 FT., 35 MM. WIDE, POST FREE, 3/6

FITCH & Co.'s Film was used for the splendid Negatives (2000 feet) taken of the Jubilee Procession by the Moto Photo Supply Co., who say

'We have obtained a splendidly clear and well-exposed negative, which speaks well for the quality of your emulsion.'

FITCH & CO.,

SELDON HOUSE, FULWOOD'S RENTS, HOLBORN, LONDON

[*See following page.*

FITCH & CO.'S Specialities.

SELECTED MATT CELLULOID.

For Focussing Screens and Squeegeeing Purposes.

THICK.		EXTRA-THICK.	
¼-plate	3/- per dozen.	¼-plate	6/- per dozen.
5×4	5/- ,,	5×4	10/- ,,
½-plate	7/- ,,	½-plate	14/- ,,
7½×5	10/- ,,	7½×5	20/- ,,
¼-plate	12/- ,,	¼-plate	24/- ,,
10×8	18/- ,,	10×8	36/- ,,
12×10	24/- ,,	12×10	48/- ,,
15×12	30/- ,,	15×12	60/- ,,

The Extra-Thick is specially recommended for the larger sizes. Any Sizes Cut.

FITCH'S ORIGINAL 'FRENA' FILMS,

ALL SIZES

CAN ALWAYS BE OBTAINED FROM

MESSRS. R. & J. BECK, Ltd., 68 CORNHILL, E.C.

Fitch's New Developing Frame for Films

Enables the operator to examine the film during development without handling, thereby avoiding risk of damage to the film, and staining of the fingers.

SPECIALLY RECOMMENDED.

¼-plate	2/- each.	¼-plate	3/9 each.
5 × 4	2/6 ,,	10 × 8	4/9 ,,
½-plate	2/9 ,,	12 × 10	6/- ,,
7½ × 5	3/- ,,	Other sizes made to order.	

FITCH'S IMPROVED LIGHT AND AIR-TIGHT JAPANNED FILM CASES.

¼-plate, holding 6 doz. films ...	1/9 each.	7½ × 5, holding 6 doz. films ...	2/6 each.
5×4	2/- ,,	½-plate	2/9 ,,
½-plate	2/3 ,,	10×8	3/6 ,,

The Lid of each case secured by a Waterproof Band.
Other sizes at Proportionate Prices.

FITCH'S FILMS

may be obtained of all Dealers in Photographic Materials throughout the World; or from

FITCH & CO.,

SELDON HOUSE, FULWOOD'S RENTS, HOLBORN, LONDON.

[*See preceding page.*

W. Watson & Sons

Manufacturers of Highest Class

PHOTOGRAPHIC INSTRUMENTS AND APPARATUS.

Awarded 38 PRIZE MEDALS for the high quality of their Instruments,

Including 3 Highest Awards, Chicago, 1893; 2 Gold Medals, Kimberley, 1892; 2 Gold Medals, Paris Universal Exhibition, 1889; the Medal of the Glasgow Photographic Society, 1891; the Amsterdam Society, 1891; Gold Medal, Budapesth, 1890; the Medal of the Photo Society of India, at Calcutta, 1889; the Gold Medal, Melbourne International Exhibition, 1888; the only Medal for Cameras, and the only Medal for Studio and Tripod Stands, at the Great Photographic Exhibition, Crystal Palace, London, 1888; the only Medal for Photographic Apparatus, Adelaide International Exhib., 1887; and the only Gold Medal for Photographic Apparatus, Liverpool International Exhib., 1886.

Nine times placed alone at International Exhibitions, receiving a higher award than any other competitor.

W. WATSON & SONS,

OPTICIANS TO HER MAJESTY'S GOVERNMENT.

ESTABLISHED 1837.

OFFICES & WAREHOUSES

313 HIGH HOLBORN, LONDON, W.C.

and 78 Swanston Street, Melbourne, Australia.

STEAM FACTORIES

9, 10, 11, 16, and 17 Fulwood's Rents, Holborn, W.C.

WATSON'S 'ACME' CAMERA.

THIS pattern was introduced and patented by us in 1889, and met at once with very great approval, both from photographers and the photographic press; since then they have been continually growing in favour, and the demand for them has steadily increased almost month by month. We have introduced some slight modifications from the original, to make it more perfect even than it was, and we feel justified in confidently stating that it is at present the most highly esteemed Tourists' Camera before the public, a place which no effort will be wanting on our part, by care in its manufacture, to cause it to retain. That it is not unworthy this position may be gathered from the notices below, cut from the leading Photographic Press; from the fact that it has been exhibited at the leading Exhibitions in the world held since its introduction—at Paris, London, Chicago, Glasgow, Calcutta, Amsterdam, Budapesth, &c.—and has each time received the first award from the judges; and the many hundreds of Testimonials received from users of the Instrument, for some of which see pages 109 to 112 of General Catalogue.

These Cameras may now be had with the principal metal fittings made in aluminium, making a saving of about one-fourth the total weight of the Instrument.

NOTICE.

There being many imitations of this Camera, we beg to state that the principal points are protected by Patents, and that no other Firm can supply a similarly constructed instrument.

PRESS OPINIONS.

BRITISH JOURNAL OF PHOTOGRAPHY.

'It folds into a smaller compass, and is lighter and more portable than any pattern we have yet seen; the back, by a novel arrangement, may, when required for use with a wide-angle lens, be pushed forward close to the front, so that there is no protruding base-board to interfere with the angle of the lens. The Portability of the Camera is remarkable.'

THE CAMERA.

In an article on the RICHMOND EXHIBITION, says:—

'Taking the novelties first, we must follow the example of the Judges, and give the premier place to Messrs. W. Watson & Sons' new Camera. It would be thought almost impossible to create anything new in the shape of a Camera, for inventors have been for years trying how they can construct one which should have every movement required by the modern photographer, and at the same time be as light as a feather and as rigid as one of the pyramids of the Pharaohs, and they have been most successful in their endeavours to accomplish this seemingly impossible thing. Yet Messrs. Watson have gone a step further, and have found out by various ingenious modifications how to make the weight still lighter and the rigid still more firm.'

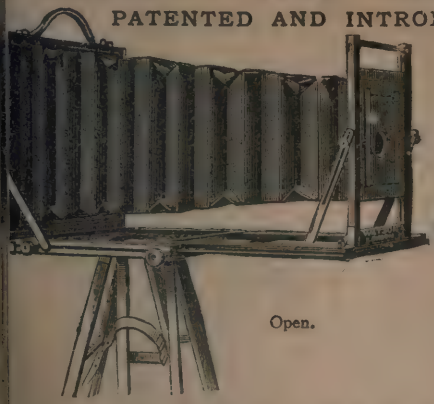
THE ENGLISH MECHANIC.

'For portability and compactness, combined with practical utility, this Camera may fairly be said to take the lead, and to be deserving of the title "Acme." The dark slides are fitted with patent stops and springs, little details which help to make this Camera as near perfection as probably can be reached.'

W. WATSON & SONS 313 HIGH HOLBORN, LONDON, W.C.

WATSON & SONS' 'ACME' CAMERAS

PATENTED AND INTRODUCED, 1889.



Open.



Closed.

DESCRIPTION.

THE principal points aimed at in the designing of this Camera were to produce an instrument—1st, that should combine every modern improvement of practical utility; 2nd, that should be as compact and portable as it possibly could be, commensurate with adequate strength and rigidity; 3rd, that should be simple in its parts, so as to avoid both difficulties in use and liability to be easily put out of order.

It has rising and falling front, with very great range in each direction.

It has swinging motion both to the back and front. The back may be swung in either horizontal or vertical directions. The front may be swung in a vertical plane, the great advantage of this being when the Camera is used for photographing objects either a great deal above or a great deal below its own level, the Camera may be tilted as in Fig. 2, p. 1096, and the front and back swung parallel to each other and exactly vertical, so giving the advantage of a great rise or fall, without any distortion—the ordinary rise or fall of the front being, of course, still available in addition.

The back portion of the Camera is arranged to slide up close to the front for use with wide-angle lenses (Fig. 3, p. 1096), so there is no projecting base-board to cut off the angle of view when a very wide-angle lens is used.

The Camera has double extension for focussing, the front moving by rack-work adjustment, the back by sliding in grooves, and being held in position by clamping screws. The extreme range of focus in the various sizes is marked against each in the list (see page 1097).

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

LIGHTNESS AND COMPACTNESS.

The solid material of which the Camera is made has been lightened in every way in which it could be done consistently with retaining necessary strength and rigidity, and while this Camera has not the absolute solidity of the heavy 'Premier' pattern, a portion of which is a necessary concomitant of its weight, it is perfectly strong, fit for hard work, and very rigid when set up—in fact, of astonishing rigidity, approaching that of solid-body Cameras—while its extreme lightness will commend it to every tourist to whom saving of bulk and weight of baggage is of consequence. Especially is the saving manifest in the large sizes. While being important in ½ and ¼ Cameras, it becomes marvellous in 12×10 and 15×12 sizes, reducing them to about one-third to one-half the bulk of ordinary Cameras. In addition to lightening by reducing substance, compactness is obtained by removing, as far as possible, all projections, the ordinary screw for clamping the rising front being dispensed with, and the fixing obtained by means of a rack and ratchet on the side, which does not add to the thickness; while the base of the front board is fixed by being pushed through spring latches into an aperture, upon which the latches close automatically, holding it securely. The latches are acted upon by plain flat springs, which are not at all likely to get out of order, and the releasing to close the Camera is done by simply inclining the front backwards to an angle of about 45°, when the latches are opened and the

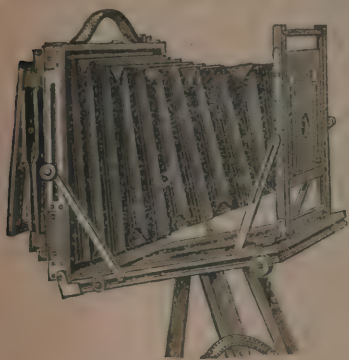


FIG 2



FIG. 3.

front released. Through these arrangements the whole front of the Camera is left perfectly flat, and folds for packing directly against the baseboard (Fig. 4), the whole space between the focus glass and the base-board being occupied by the bellows and front board when the Camera is closed; any thickness beyond this would not be absolutely necessary. The thickness of the Camera when closed is, therefore, regulated by the combined substance of base-board, bellows, front, and focus glass, pressed closely together, beyond which it is impossible to go.

The back of the Camera is made with our usual Reversing Frame, so that horizontal or vertical pictures may be taken without altering the position of the Camera.

The base of the Camera may either be panelled in the usual manner with a screw socket in its centre to be fitted to a separate tripod and held by a T screw, or it may have in the base (Fig. 5) a turntable of a new and exceedingly light and firm design, with a suitable triple folding stand, for extra price of which see price list. The turntable is entirely of brass, perfectly strong, yet so light as to add practically nothing more than the weight of the wood it replaces to the Camera.

The dark slides are all fitted with our patented stops and springs to the shutters. The stops dispense with the projecting screws ordinarily used inside shutters of dark slides, and leave them perfectly clear inside for the reception of carriers, if required.

W. WATSON & SONS, 313 HIGH HOLBORN LONDON, W.C.

The springs automatically hold in the shutters when closed after exposure, and being placed on the outside of the frame, and not cut into it, there is no danger of their admitting light to the plates. The slides, fronts, and screw nuts are also all fitted to standard gauges, so that additional ones in any size may be obtained on application without the necessity of sending the Camera to be fitted.

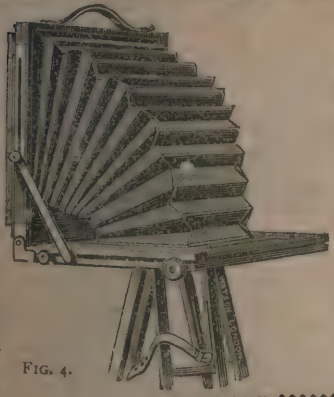


FIG. 4.

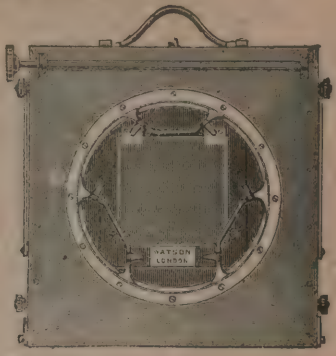


FIG. 5.

PRICE LIST.

Included with each Camera are three double Dark Slides. If less or more are required, the cost of separate Slides, as per Price List, page 1119, may be deducted or added.

Nos.	Sizes in inches.	Prices.	Extra for Turntable in base and 3-fold stand.	Extra if all Brass Bound.	Range of Focus in inches.	Best solid Leather Travelling Cases.
		£ s. d.	£ s. d.	£ s. d.		£ s. d.
3001	6¼ × 4¾	9 12 0	2 2 0	1 10 0	15	1 15 0
3002	7½ × 5	10 0 0	2 2 0	1 10 0	17	1 15 0
3003	8½ × 6½	12 5 0	2 2 0	1 15 0	19	2 2 0
3004	10 × 8	14 0 0	2 10 0	2 0 0	21	2 10 0
3005	12 × 10	16 12 [illegible]	2 15 0	2 10 0	26	3 0 [illegible]
3006	15 × 12	21 0 0	3 3 0	3 0 0	33	3 15 0
3007	18 × 16	31 10 0	4 4 0	4 0 0	40	6 0 0

The Camera may also be had with all the metal fittings of aluminium. For extra cost see page 1101.

The 8½ by 6½ Camera may be made with an extra wide front and a movable central partition, to use it for stereoscopic pictures, at an extra cost of £1.

An Ash strut with two hinged joints to attach between the leg of Tripod and fron of 'Acme' Camera, adjustable to focus, but principally intended for use when Camera is fully extended or when a very heavy Lens is used, to maintain perfect rigidity. Price, for Cameras up to 10×8, 7*s.* 6*d.*; 12×10 and 15×12, 10*s.* 6*d.*

(It is necessary to have the Camera to make the fitting.)

NOTE.—The above Prices are subject to 5% Discount for Cash with Order.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON W.C.

COMPLETE 'ACME' OUTFITS.

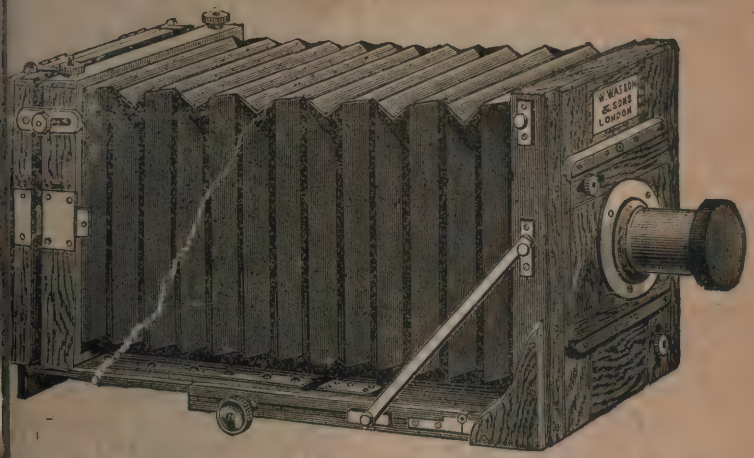
Any Item not required may be left out of the Set, and its Cost Deducted, or any parts changed to suit the Purchaser.

Nos. ... Sizes...	3008 6½×4¼	3009 7½×5	3010 8½×6½	3011 10×8	3012 12×10	3013 15×12	Continental Sizes in Centimetres. 3022 18×13	3023 21×15	3024 24×18	3025 27×21	3026 30×24
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
'Acme' Camera & 3 Double Slides	9 12 0	10 0 0	12 5 0	14 0 0	16 12 6	21 0 0	10 0 0	13 5 0	14 0 0	15 0 0	16 13 6
Rapid Rectilinear Lens, with Iris Diaphragm ...	4 0 0	4 10 0	5 0 0	6 15 0	8 15 0	11 10 0	4 10 0	5 0 0	6 15 0	8 15 0	8 15 0
Solid Leather Travelling-case, with Spring Lock ...	1 15 0	1 15 0	2 2 0	2 10 0	3 0 0	3 15 0	1 15 0	2 2 0	2 10 0	3 0 0	3 0 0
Rotating Turntable in base, & Tripod Stand	2 2 0	2 2 0	2 2 0	2 10	2 15	3 3 0	2 2 0	2 2 0	2 10 0	2 15 0	2 15 0
Instantaneous Shutter	1 0 6	1 0 6	1 3 6	1 7 6	1 7 6	1 12 6	1 0 6	1 3 6	1 7 6	1 7 6	1 7 6
	18 9 6	19 7 6	22 13 6	27 2 6	32 10 0	41 0 0	19 7 6	23 13 6	27 2 6	30 17 6	33 10 0
Extra, if Camera and Slides are brass bound ...	1 10 0	1 10 0	1 15 0	2 0 0	2 10 0	3 0 0	1 10 0	1 15 0	2 0 0	2 10 0	2 10 0
Replacing Brass fittings to Camera and Slides by Aluminium...	2 10 0	2 10 0	3 0 0	3 10 0	4 0 0	4 10 0	2 10 0	3 0 0	3 10 0	4 0 0	4 0 0
Alumin. mounted Cameras bound with Aluminium for abroad, in similar way to Brass binding...	1 10 0	1 10 0	1 15 0	2 0 0	2 10 0	3 0 0	1 10 0	1 15 0	2 0 0	2 10 0	3 0 0
Replacing Brass R.R. Lens Mount by Aluminium...	1 0 0	1 0 6	1 5 0	1 10 0	2 0 0	2 10 0	1 0 0	1 5 0	1 10 0	2 0 0	2 0 0
Wide Angle Rectilinear Lens for Photographing in confined situations, interiors, &c.	3 17 6	4 10 0	4 10 0	5 10 0	6 15 0	8 5 0	4 10 0	4 10 0	5 10 0	5 10 0	6 15 0
Waterproof Focusing Cloth ...	0 7 6	0 7 6	0 7 6	0 7 6	0 10 0	0 10 0	0 7 6	0 7 6	0 10 0	0 10 0	0 10 0

Mounted on Cloth with Outer

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

Watson & Sons' PREMIER CAMERAS



Made with interchangeable parts, so that the dark slides, fronts, and screw nuts, made for one Camera will fit any other for the same size Plates, and duplicates can at any time be obtained without the necessity of sending the Camera to be fitted. All the sizes up to and including 10×8 are fitted with WIDE FRONT and MOVEABLE CENTRAL PARTITION, so that they are available for Stereoscopic work. Larger sizes may also be so fitted if desired. They may also be fitted with a repeating back interchangeable with the reversing frame and exactly similar to that supplied with the Universal Studio Camera to take 2 pictures on one page. For extra cost see next page. These Cameras are of the

VERY HIGHEST QUALITY AND WORKMANSHIP.

This pattern was originally introduced by us in 1883, and, despite the numerous other forms that have appeared since in the market, they still hold their position, and command a large sale, no pattern having been designed to excel them for strength, durability, and convenience to use.

[*For full description and prices see next page.*

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

WATSON'S 'PREMIER' CAMERAS have Double Extension to Focus, giving very long range, Double Swinging-Back, Rising and Falling Front, and all sizes up to 10×8 have Moveable Central Partitions and Sliding Fronts to use for Stereoscopic work, or two pictures on a plate with either one or a pair of Lenses. The Dark Slides, Fronts, Clamping Screws, and Nuts made to standard gauges, so as to be interchangeable in the various sizes, while extra ones can at any time be supplied without the necessity of sending a Camera to fit them. This model is probably the most practically useful all-round Camera ever designed, and the demand for them has increased steadily since their introduction in 1883. Made only in the very highest quality and workmanship.

	3039 6½ by 4¾			3040 7½ by 5			3041 8½ by 6½			3042 10 by 8			3043 12 by 10			3044 15 by 12			3045 18 by 16			Continental Sizes in Centimetres. 13 by 18			21 by 15			24 by 18			27 by 21			24 by 30			33 by 27		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Cameras and 3 double slides	9	12	0	10	0	0	12	5	0	14	0	0	16	12	6	21	0	0	31	10	0	10	0	0	12	5	0	14	0	0	15	0	0	16	12	6	18	0	0
Rapid Rectilinear Lens, with Iris diaphragm ...	4	0	0	4	10	0	5	0	0	6	15	0	8	15	0	11	10	0	16	0	0	4	10	0	5	0	0	6	15	0	8	15	0	8	15	0	11	10	0
Solid Leather Travelling Case, with spring lock	1	15	0	1	15	0	2	2	0	2	15	0	4	4	0	2 Cases 6	15	0	8	15	0	1	15	0	2	2	0	2	15	0	3	3	0	4	4	0	5	10	0
Folding Tripod Stand ...	1	5	0	1	5	0	1	10	0	1	10	0	2	2	0	2	10	0	3	3	0	1	5	0	1	10	0	1	10	0	1	10	0	2	2	0	2	2	0
Instantaneous Shutter, with pneumatic release	1	0	6	1	0	6	1	3	6	1	7	6	1	7	6	1	12	6	2	2	6	1	0	6	1	3	6	1	7	6	1	7	6	1	7	6	1	12	6
	17	12	6	18	10	6	22	0	6	26	7	6	33	1	0	43	7	6	61	10	6	18	10	6	22	0	6	26	7	6	29	15	6	33	1	0	38	14	6
Extra, if Camera and Slides are brass bound for hot Countries... ...	1	10	0	1	10	0	1	15	0	2	0	0	2	10	0	3	0	0	4	0	0	1	10	0	1	15	0	2	0	0	2	5	0	2	10	0	2	10	0
Extra for adding repeating back for portraiture, to take 2 pictures on one plate, as with a Universal Studio Camera...	2	0	0	2	0	0	2	10	0	3	3	0	3	10	0	4	0	0	5	0	0	2	0	0	2	10	0	3	3	0	3	10	0	3	10	0	4	0	0
Wide Angle Rectilinear Lens for Interiors and close situations	3	17	6	4	10	0	4	10	0	5	10	0	6	15	0	8	5	0	11	10	0	4	10	0	4	10	0	5	10	0	5	10	0	6	15	0	8	5	0

Any item in above estimates may be purchased alone; or left out from the set if desired and [illegible] cost deducted. The prices are subject to 5 per cent. Discount for Cash with order [illegible] is made at time of purchasing Camera, one of the slides both in this and the ordinary frame.

For Slides to Repeating Back, see various sizes in List, page 1119; or if this additio[illegible] (single or double) supplied, may be fitted free of cost to use

For prices of 'Premier' Lenses, see page 1115. For extra Dark-Slides or Inner Frames, see page 1119.
For Aluminium Mounts, se[illegible] page 1101.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

SPECIAL NOTICE.

ALUMINIUM FITTINGS.

REDUCTION IN PRICES.

WE continue to mount our Cameras in Aluminium, and, consequent on a reduction in the cost of raw material, and our increased facilities for working this metal, are able to offer Cameras so mounted at much lower rates than formerly.

We strongly recommend Aluminium mounts to those who desire a very light yet serviceable Apparatus. A saving in weight of about one-fourth is effected. The metal has a small percentage of alloy, rendering it exceedingly tough and strong, and as efficient as brass.

It has a very handsome appearance when finished, resembling silver, while, in addition, it keeps its colour and is not liable to tarnish as silver does. We have given special attention to the working of it, with a view to supplying Aluminium-mounted Cameras of undoubted strength and efficiency at the lowest possible cost, and we are convinced that the great saving in weight of apparatus caused by using this metal will make Cameras so mounted come into almost universal use. A reduction has also been made in the price of Aluminium mounts for Lenses. For prices, see page 1114.

The following Table shows the additional cost for substituting Aluminium instead of Brass fittings to the various size Cameras.

SIZES.		'PREMIER' CAMERAS, With full Aluminium Fittings.	'ACME' CAMERAS.	
			Replacing Brass Turntable and Ring by Aluminium.	Full Aluminium Fittings including Turntable.
English Inches.	Centimetres.	£ s. d.	£ s. d.	£ s. d.
½ plate and				
7½ + 5	18×13	2 10 0	0 15 0	2 10 0
8½ × 6½	21×16	3 0 0	0 15 0	3 0 0
10 × 8	24×18	3 10 0	0 18 0	3 10 0
12 ×10	30×24	4 0 0	1 2 6	4 0 0
15 ×12	33×27	4 10 0	1 7 6	4 10 0

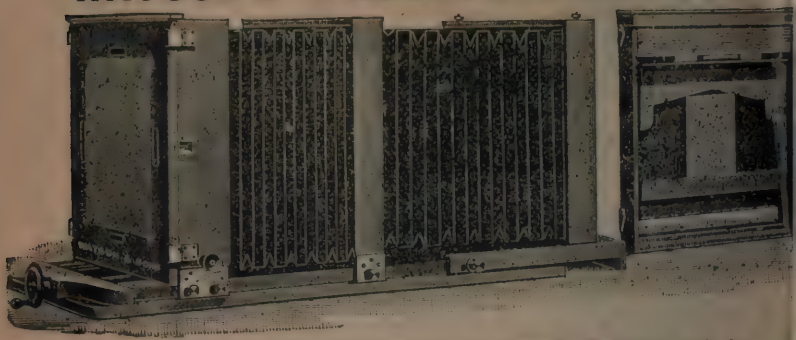
Cameras with Aluminium mounts may also, if desired, be *bound* with Aluminium in a similar manner as when bound with brass, the extra cost being the same only as quoted for brass binding against each size.

The dark slides supplied with Aluminium-mounted Cameras have also Aluminium mounts, and a specially choice wood of very light weight is selected for these Cameras.

NOTE.—The above prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

WATSON'S 'PROCESS' CAMERAS.



IN consequence of the great demand for 'Process' Cameras, and the difficulty of obtaining really well-made Instruments, we have added them to the other patterns we now manufacture. Our extensive plant of machinery permits of our making these Cameras with the requisite accuracy and precision, and at prices that will be found to compare favourably with other makers.

We therefore invite 'Process' workers to call and see one of these Cameras before purchasing elsewhere. They are of the same high quality and workmanship as our well-known 'Acme' and 'Premier' Cameras, and are made of specially selected and seasoned wood to resist rough usage and hard wear. The metal parts are proportionately strong, and are made, as usual, in our own workshops. The focussing adjustment is made by means of an endless screw of special pattern with squarethread, which will last indefinitely. The screen holder, which is adjusted by rackwork, is fitted with an indicator showing the distance between the screen and the negative, and is arranged to take also smaller sizes of screens by an adjustable carrier. The dark slide is provided with a roller shutter instead of the usual pull-out form, and has a carrier adjustable to any smaller size of plate. The front is provided with rising motion.

There is also provided a complete set of carriers down to ¼ plate, and fitted in the front for use when the Camera is required for enlarging, the lens then being attached to the middle body of the Camera. The bellows is made of strongest twill, and can be relied on for its lasting capabilities.

No detail in the construction of these Cameras that will assist in making them in any way more perfect and convenient in use is neglected, and we can recommend them with every confidence.

PRICE LIST.

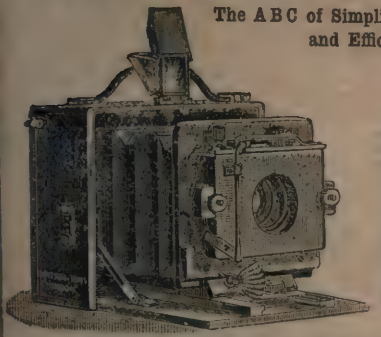
3059	...	...	...	12 × 10	...	...	25 10	0
3060	...	...	...	15 × 12	...	...	31 10	0
3061	...	...	...	20 × 16	...	...	42 0	0
3062	...	...	...	24 × 20	...	...	53 10	0

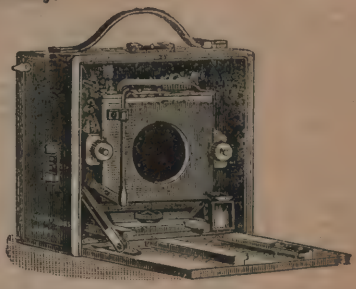
NOTE. The above prices are subject to a discount of 5 per cent. for Cash with order.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

WATSON'S ALPHA HAND CAMERA

The A B C of Simplicity, Compactness and Efficiency.





MADE in box form, of sufficient size to contain, when closed, the Bellows, Front, Rapid Rectilinear Lens, Shutter, and Finder. The front of the box falls down to form a base, and is held rigid and horizontal by a strut, which is fixed by being pressed home into a notch at its upper end; to close the Camera, slightly lift the strut, and it will then fold in as the box is closed. The front of the Camera is extended along the base, and there is a scale with distances marked on it, by which the focus can be immediately set, but a ground glass screen is also supplied to use if desired. A socket is fixed in the side and base to attach to a Tripod. The Finder is so arranged that the view may be seen either by looking into or through it, according to the position in which the Camera is held; there are two fittings to receive it—for vertical and horizontal pictures. The Shutter is a specially small Thornton-Pickard Time and Instantaneous, fitted with our mechanical discharger. The whole apparatus is of highest quality, workmanship, and finish, and is probably the smallest complete apparatus yet introduced. The Cameras may be supplied complete as above—or alone—or fitted to any suitable Lens, Dark Slides, and Shutter.

	¼	5×4	½-plate.
Made in Three Sizes			
Prices of Cameras, without Slides ...	**£1 10 0**	**£1 15 0**	**£2 10 0**
Outside Size of Boxes	5¼×3×5	6×3¼×5¼	7¼×3¼×6¼

Cameras made to special sizes to suit individual Lenses or Slides, at slightly enhanced cost, according to the extra work involved.

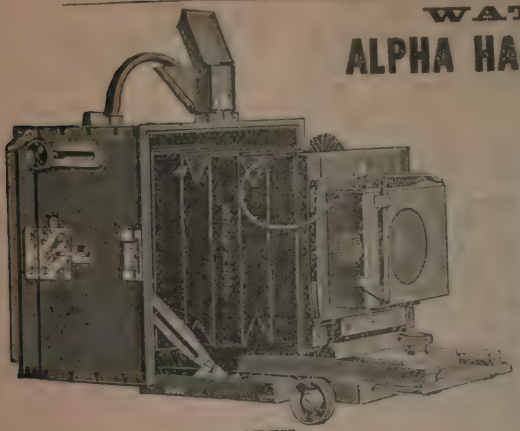
ALPHA COMPLETE OUTFITS, No. 1.	ENGLISH Measure.			CONTINENTAL Measure.	
Nos.	3081	3082	3083	C/metres.	C/metres.
Sizes	¼	5×4	½-plate.	9×12	18×13
Camera and 3 Double Slides ...	£3 15 0	£4 6 0	£5 10 0	£4 6 0	£6 0 0
WATSON'S Rapid Rectilinear Lens, with Iris Diaphragm	2 17 6	3 2 6	4 0 0	3 2 6	4 10 0
Exposure Shutter	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
Finder	0 10 6	0 10 6	0 10 6	0 10 6	0 10 6
Travelling Case	0 12 6	0 15 0	1 0 0	0 15 0	1 2 0
	£8 15 0	£9 14 0	£12 0 6	£9 14 0	£13 2 6

These Cameras may be fitted with the following extras:

Rising instead of Rigid Front	£0 5 6
Double-action Front (Rising and Sliding)	0 10 6
Swinging Back	0 15 0
Simple Rackwork Focussing Adjustment	0 15 0
Best Rackwork Adjustment, two Racks and Compound Base-board, giving Long Range Focus, as shown, p. 1104	1 10 0

NOTE.—The above prices are subject to 5% Discount for Cash with Order.

WATSON'S
ALPHA HAND CAMERAS.



OPEN.



CLOSED.

IN the following outfits the Cameras are practically the same as those quoted on the preceding page, but with the additions of Double action Front, Double Extending Base, Swing Back and Rackwork Adjustment, the range being sufficient to allow of a single combination of the Rapid Rectilinear Lens supplied, being used alone for distant views. These Cameras, both alone, and in complete sets as listed, are kept in stock ready for immediate delivery.

COMPLETE OUTFITS.

	ENGLISH.			CONTINENTAL.	
No.	3087	3088	3089	3090	3091
Sizes	½-plate.	5×4	6½×4¼	9×12 c/m.	13×18
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Camera with Double Action Front, Double Extending Base, Swing Back and Rackwork Focussing Adjustment, and 3 Double Dark Slides	6 10 6	7 1 6	8 5 6	7 1 6	8 15 6
Rapid Rectilinear Lens, with Iris Diaphragm	2 17 6	3 2 6	4 0 0	3 2 6	4 10 0
Exposure Shutter	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
Finder	0 10 6	0 10 6	0 10 6	0 10 6	0 10 6
Best Solid Leather Travelling Case, with Lock and Key ...	1 2 0	1 5 0	1 10 0	1 5 0	1 10 0
	12 0 6	12 19 6	15 6 0	12 19 6	16 6 0
Extra if Camera and Slides are Brass Bound for hot climates	1 2 0	1 5 0	1 10 0	1 5 0	1 10 0
Extra for Leather Covered Body and Bronzed Mounts	0 12 6	0 15 0	0 18 0	0 15 0	0 18 0
Aluminium instead of Brass Mounts	0 19 6	1 1 0	1 3 6	1 1 0	1 5 6
Aluminium Binding in similar manner to Brass Binding—supplied only to Aluminium Mounted Cameras	1 2 0	1 5 0	1 10 0	1 5 0	1 10 0

The above prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON.



THE 'VANNECK' HAND CAMERA.

The very fine Enlargement of 'Breaking Waves,' exhibited by Mr. Marsh at the Salon 1893, was made from a Negative taken in a 'Vanneck' Camera.

MADE in two sizes, the one to hold 12 glass plates $4\frac{1}{4} \times 3\frac{1}{4}$ in., and the other to hold either a magazine containing 12 glass plates $3\frac{1}{4} \times 3\frac{1}{4}$ ins., or a roll-holder for films of the same size.

The View Finder is in the middle of the top of the box, and shows the image the same size as is being taken on the sensitive plate. The one lens is used for both finder and plate, and is so arranged that when the image is *seen* sharply it is necessarily in focus on the plate. To use this finder, a milled head is fitted under the box, which moves the lens to and fro to focus, and, as the operator looks into his finder to see what he is taking, he can, by a turn of this screw, immediately set any object seen, near or distant, into perfectly sharp focus. There is also provided a scale of distances, so that the Camera may be set in focus without using the ground glass.

The shutter will give either instantaneous or timed exposures.

The sensitive plates are contained in a reservoir at the back of the box; this is provided with 12 metal sheaths to hold them, and the changing is done by means of a T nut outside. This is turned round, and actuates a lever which raises the plate into a flexible bag at the top of the reservoir; it may then be lifted by the fingers inside the bag and removed from the back of the reservoir to the front. Either glass plates or celluloid films may be used. The Camera is fitted with a socket to attach to an ordinary Tripod when required.

PRICE LIST.

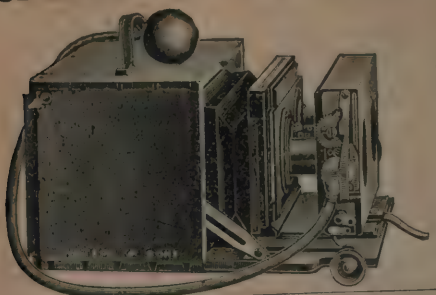
		£	s.	d.
3396.	$4\frac{1}{4} \times 3\frac{1}{4}$ in. Camera, with Special Rapid Rectilinear Lens, and Sheaths to hold 12 Dry plates ...	10	10	0
	Extra cost if fitted with Sheaths for 24 Films ...	0	15	0
3097.	$3\frac{1}{4} \times 3\frac{1}{4}$ in. Camera, to hold 12 Plates	9	10	0
3098.	$3\frac{1}{4} \times 3\frac{1}{4}$ in. ditto, with Roll Holder only	10	0	0
	Outer Travelling Case of Solid Leather (with sling) for hard service or use abroad, to fit $4\frac{1}{4} \times 3\frac{1}{4}$ in.	1	2	6
	Do. do. do. $3\frac{1}{4} \times 3\frac{1}{4}$ in.	1	0	0

Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313 High Holborn, London, W.C.

SPECIAL STEREOSCOPIC OUTFIT

(Alpha Pattern).



3092.

Comprising Camera and three Double Slides, Pair of 6-in. Rapid Rectilinear Lenses, Thornton-Pickard Stereoscopic Shutter with Speed Indicator, and Finder. The Camera has Rackwork Focussing Adjustment, Rising Front and Swing Back.

Price, £15 10s. 6d.

Solid Leather Case with Lock for above, **£1 10s.**

WATSON'S DOUBLE CAMERAS.





THE Demand for a Camera in which the Object can be seen Full Size, and focussed up to the moment of exposure, has greatly increased during the past few years, these conditions having been found necessary to secure photographs of moving objects with *absolute certainty of result*. The principal drawback to a Double Camera, hitherto, has been the bulk, but we are now constructing it on improved principles, and the dimensions having been reduced to the smallest possible, it is very little larger than an ordinary Camera. The instrument when supplied complete is fitted with a pair of Rapid Rectilinear Lenses, a Thornton-Pickard Time and Instantaneous Shutter, and three Double Slides. It has also a Sling for supporting the Camera on the chest, in use, or on the back when out of use. The exact size of the Camera made for ¼-plates is **8½ × 9 × 10 in.**, and weight, complete, **9 lbs.** The box is mahogany, covered with solid leather, and the whole apparatus is very strongly built.

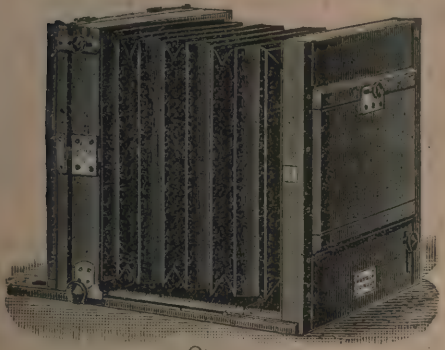
Nos.	3093	3094	3095
Size of Plate ...	4¼ × 3¼	5 × 4	6½ × 4¼
Price, complete ...	**£15 15s.**	**£17**	**£20**
Dimensions ...	7 × 5¼ × 7½	7¾ × 6 × 8	8½ × 9 × 10

A Swing Back for use with the Camera when on a Tripod can also be supplied.
Price 4¼ × 3¼ and 5 × 4 ... **£1 7s. 6d.** 6½ × 4¼ ... **£1 10s.**
Customers' own Lenses and Shutters can also be adapted.

The above Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS 313 HIGH HOLBORN, LONDON, W.C.

Watson & Sons' 'Popular Cameras.'



OPEN.



CLOSED.

THE Cameras have leather bellows body, folding base-board, rackwork focussing adjustment, swinging back, three double dark slides, and double action front, and are exceedingly light and compact. They are made in two kinds—'A,' horizontal, adapted to use on its side for upright pictures; and 'B,' square, with reversing frame at back, to take either horizontal or vertical pictures without moving the Camera.

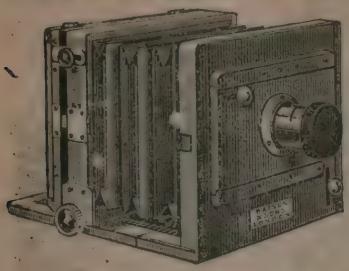
They are exceedingly full value for their cost, and are very strong, serviceable instruments, that can be thoroughly recommended to stand hard use; the 'B' form is an especially convenient Camera.

Nos.	Sizes.	Prices. A			B			The larger sizes may be fitted with extra front, and movable central partition for stereoscopic work at the following extra cost:—
		£	s.	d.	£	s.	d.	
3073	4½ × 3½	4	10	0	5	0	0	
3074	5 × 4	4	15	0	5	5	0	
3075	6½ × 4¾	5	15	0	6	15	0	0 10 6
3076	8½ × 6½	7	10	0	8	10	0	0 10 6

NOTE—The above prices are subject to 5 per cent. Discount for Cash with order.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

LIGHT PORTABLE TOURISTS' CAMERAS.





Made with double-action fronts, and moveable central partitions, useful either for single pictures or stereoscopic, have rackwork for focussing, are adapted to turn on side for upright pictures, no loose fastenings, have leather bellows, hinged focussing glass, and folding base-board, are of the finest workmanship, and as *light* and *compact* as *possible*, each complete with three double dark slides, fitted with patented stops and spring catches, and two fronts. These Cameras, while being very light and compact, are exceedingly strong and rigid, and are equally suitable to use in the *hand* as on a tripod.

		Price, with Swing Back.	Brass Binding, Camera & Slides.	Black Travelling Case with lock & key.
3063	For Plates 6½ by 4¼ ...	£7 0 0	£1 5 0	£1 1 0
3064	,, 7½ ,, 5 ...	7 5 0	1 5 0	1 2 6
3065	,, 8¼ ,, 6½ ...	8 15 0	1 12 0	1 10 0
3066	,, 18 ,, 13 c/m.	7 5 0	1 5 0	1 2 6

'C' COMPLETE SETS.

Consists of light Tourist's Camera as above, with three double dark slides fitted with patented stops and patented spring catches to the shutters, Rapid Rectilinear Lens with Iris Diaphragm, Exposure Shutter, Finder, a best three-fold Tripod Stand, and a solid leather travelling case to hold Camera, Slides, and Lens.

Nos. ...	3067	3068	3069	3070
Sizes ...	6½ × 4¼	7½ × 5	8½ × 6½	18 × 13 c/m.
Tourist's Camera and 3 Double Slides	£7 0 0	£7 5 0	£8 15 0	£7 5 0
Rapid Rectilinear Lens with Iris Diaphragm	4 0 0	4 10 0	5 0 0	4 10 0
Alpha Finder to use either by looking through (horizontally) or into (vertically)	0 10 6	0 10 6	0 10 6	0 10 6
Solid Leather Travelling Case	1 5 0	1 7 6	1 10 0	1 7 6
Tripod Stand	1 5 0	1 5 0	1 5 0	1 5 0
	£14 0 6	£14 18 0	£17 0 6	£14 18 0
Extra if Camera and Slides are brass bound for India	1 5 0	1 5 0	1 12 0	1 5 0
Waterproof Focus Cloth	0 7 6	0 7 6	0 7 6	0 7 6

NOTE.—The above Prices are subject to 5 *per cent. Discount for Cash with Order.*

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

WATSON'S UNIVERSAL STUDIO CAMERA



Of Spanish Mahogany Leather Bellows Body.

Very Strongest and Best Workmanship.

Will do all the work in a Studio, and if properly used, last a lifetime.

THIS CAMERA is perhaps the most useful Studio Camera extant. It has bellows body, extending in front by sliding and at back by endless screw, so that it has sufficient range to allow of its being used for the longest or shortest focus lens, and it may be used also for copying. It has swinging back, and takes the size plates quoted either way, horizontal or vertical. The ground-glass frame may either be hinged (as illustrated) or (as usually made) slide along when the dark slide is put in position.

With one of these Cameras alone all the work of an ordinary studio may be done, and with much greater convenience than where two or three different Cameras are employed the trouble of changing one size Camera for another being avoided.

3105	For Plates $6\frac{1}{2}\times4\frac{3}{4}$. May be used for either two Cartes-de-Visite on one Plate, $6\frac{1}{2}\times4\frac{3}{4}$, or one single Picture on any size up to and including $6\frac{1}{2}\times4\frac{3}{4}$, focus from $4\frac{1}{2}$ in. to 18 in.	£6	0	0
3106	For Plates $8\frac{1}{2}\times6\frac{1}{2}$. Will take two Cabinets on $8\frac{1}{2}\times6\frac{1}{2}$, and two Cartes-de-Visite on $6\frac{1}{2}\times4\frac{3}{4}$, or one Picture on any size up to and including $8\frac{1}{2}\times6\frac{1}{2}$, length of focus from $5\frac{1}{2}$ in. to 22 in.	7	7	0
3107	For Plates 9×7. For either two Cabinets or two Cartes-de-Visite, with Carriers $8\frac{1}{2}\times6\frac{1}{2}$, and $6\frac{1}{2}\times4\frac{3}{4}$, focus from $5\frac{1}{2}$ in. to 22 in.	7	17	6
3108	For Plates 10×8. For two Boudoir Portraits, two Cabinets, or two Cartes-de-Visite, with Carriers for $8\frac{1}{2}\times6\frac{1}{2}$, and $6\frac{1}{2}\times4\frac{3}{4}$, focus from 6 in. to 24 in.	8	17	6
3109	For Plates 12×10. With Carriers 10×8, and $8\frac{1}{2}\times6\frac{1}{2}$	10	15	0
3110	For Plates 15×12. With Carriers 12×10 and 10×8	15	15	0

These Cameras may be supplied, if required, having double swinging back instead of vertical swing only. Cost would then be extra for 3105, 3106, £1; 3107, 3108, £1 5s. 3109, £1 15s.; 3110, £2.

The focussing arrangement may be by rack and pinion instead of endless screw, if preferred, at same prices.

Included with each Camera is one single slide and one inner frame, but double slides may be substituted, if preferred, at the difference in cost. For prices, *see* page 1119.

Note.—The above Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

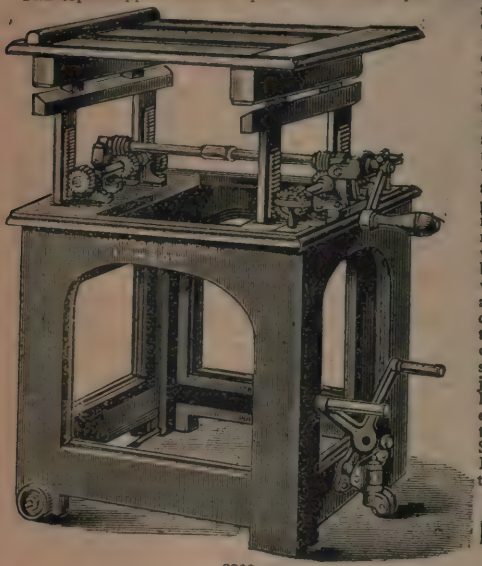
STUDIO CAMERA STANDS.

DURING the last few years the models of all our Studio Stands have been modified, to improve them both in point of Elegance and Stability; we have also reconstructed all our gearings, and those now used have been made on the principles we have found by experience to work the most smoothly, and last longest. We feel every confidence in claiming that the high quality we have attained in the manufacture of these Stands is unsurpassed, and that nothing approaching them in value for cost has ever been elsewhere offered. They are all made of thoroughly seasoned wood, and in first-class workmanship.

WATSON'S 'PREMIER' STUDIO STAND.

FOR LARGE CAMERAS.

THE top is supported on four pillars and raised by four racks working with one handle, and, the weight being thus distributed, the up and down movement is exceedingly easy; also, by a simple device, one pair of racks, either the front or back, may be thrown out of gear, and the other be moved alone, and a tilting motion so obtained; this is most convenient to use, and holds the top, inclined at any angle, perfectly rigidly. The stand is mounted on wheels to move about, but, by pushing with the foot the lever at the back to one side, the back wheel is thrown out of gear, and the stand remains solid on the ground; by reversing the lever, the wheels are at once available to move the stand. There are also adjusting screws, to adapt the legs to stand firm on uneven floors when required. A thoroughly practical Stand. Strongly recommended. Made in mahogany; size of top, 24 in. × 20 in.



3203.

Price £8 10s.

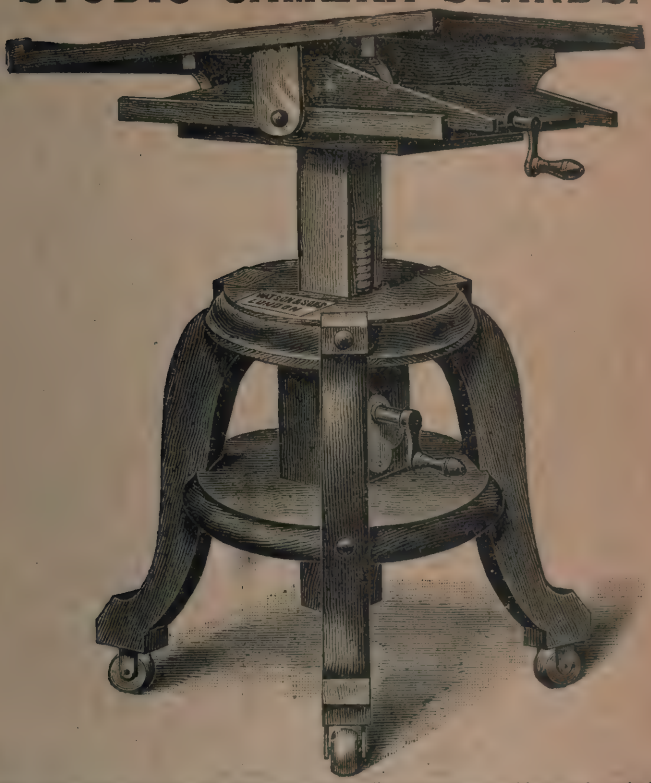
PREMIER STAND as above, but extra large and massive; size of top 36 in. × 24 in. made to order only, **£15 15s.**

The lip at the top of these Stands, against which the Camera butts, is made removeable, leaving the top flush, that in the event of carrying a very large Camera, for copying, &c., it may overhang, if desired, at front and back.

NOTE.—The above Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, W.C.

STUDIO CAMERA STANDS.



3207 Extra large and exceedingly handsome Studio Table Stand as illustrated, made in polished mahogany, and of the very finest workmanship throughout, with best screw and rack work to raise and lower, screw and inclined plane tilting arrangement to top; size of top 27 ins. × 19 ins. This Stand is of the very highest quality, and altogether of superior workmanship and appearance to what is usually supplied in these articles **£12 10 0**

3208 An exactly similar Stand to above, but of smaller dimensions, the table measuring 19 in. × 14 in., and the other parts made proportionate—also of very highest quality **9 10 0**

3209 A similar pattern Stand, but made in polished pine—size of top 22 ins. × 17 ins. **7 15 0**

The above Stands are finished in the same high-class manner as our Cameras, and in addition to their utility, form handsome pieces of furniture in the studio of a professional or amateur.

Larger Stands of any kind made to special order, or designed to meet special requirements.

NOTE.—The above Prices are subject to 5 per cent. Discount Cash with Order.

—: WATSON'S :—
PHOTOGRAPHIC LENSES.

MADE throughout in our Holborn factory, and of the most perfect workmanship and very highest efficiency, having the excellent qualities of crispness of image and depth of focus combined in a eminent degree, according to their various forms; while our system of inspection, and the constant care exercised in supervising the manufacture, ensures that the very high standard of excellence we aim at is regularly maintained. Each Lens, when it leaves the workshop, is carefully tested before being passed as ready for sale, and its quality and efficiency therefore may be implicitly relied on. We feel confident in stating that no manufacturer in the world produces more perfect instruments, and at very few establishments can they be equalled. Any Lens can, if desired, be sent to Kew Observatory for trial, and a certificate obtained of its absolute perfection, at a cost of 10s. 6d. We would also draw attention to the use of Aluminium for LensMounts, which makes an enormous difference in the weights, especially of the larger Lenses. The extra cost for mounts of this material will be found marked against each. The metal used is not pure Aluminium, but is alloyed with a metal which, while not practically affecting its lightness, makes it exceedingly tough, and strong enough to stand the wear and tear of general Lens use, which pure Aluminium fails to do satisfactorily.

WATSON'S RAPID RECTILINEAR LENSES.

Emphatically the most generally useful, as they are the most popular, Lenses made.
For Groups, Views, and all kinds of Outdoor Photography.

	In Rigid Mounts.				With case of Waterhouse Diaphragms	If with Iris Diaphragm instead of Waterhouse stops.	Aluminium Mounts, with Iris Diaphragm.
	Sizes of Plates. English In.	Centims.	Diameter.	Equiv. Focus.	Prices.	Prices.	Prices.
3121	4¼ by 3¼	...	¾ in.	5 in.	£2 10 0	£2 17 6	£3 12 6
3122	5 ,, 4	12 by 9	1 ,,	6 ,,	2 15 0	3 2 6	3 17 6
3123	6½ ,, 4¾	16 ,, 12½	1¼ ,,	8 ,,	3 10 0	4 0 0	5 0 0
3124	8 ,, 5	18 ,, 13	1½ ,,	8½ ,,	4 0 0	4 10 0	5 10 0
3125	8½ ,, 6½	21 ,, 15	1½ ,,	11 ,,	4 10 0	5 0 0	6 5 0
3126	10 ,, 8	24 ,, 18	2 ,,	13½ ,,	6 0 0	6 15 0	8 5 0
3127	12 ,, 10	30 ,, 24	2½ ,,	16 ,,	8 0 0	8 15 0	10 15 0
3128	15 ,, 12	33 ,, 27	2½ ,,	20 ,,	10 10 0	11 10 0	14 0 0
3129	18 ,, 16	40 ,, 30	3 ,,	24 ,,	15 0 0	16 0 0	19 10 0
3130	22 ,, 20	...	3½ ,,	30 ,,	22 0 0	23 10 0	28 10 0

Nos. 3121 and 3122 may be had accurately paired for Stereoscopic Work.

The magnificent picture of the Prince of Wales's Yacht, "Britannia," racing at fullest speed by Mr. A. Debenham of Ryde, was taken in August, 1893, with Watson's 18 × 16 Rapid Rectilinear Lens.

The magnificent pictures of St. Mark's, Venice, and St. Peter's at Rome, exhibited to show the perfection of Thomas's Sandell Plates, were taken by Mr. Sandell with Watson's 15 × 12 Rapid Rectilinear Lens.

We recommend these Lenses as specially suitable for Process Cameras, and have supplied a large number of them to some of the foremost Process Firms.

NOTE.—The above Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON.

Watson's Premier Lenses.

Suitable for Portraits and Groups in the Studio, or Rapid Outdoor Work, Moving Objects, &c. Exceedingly rapid, with great depth of focus, and very flat field.
Working aperture, F/5·6.

IN RIGID MOUNTS, WITH IRIS DIAPHRAGMS.

	Sizes of Plates.		Diameter.	Equiv. Focus.	Mounted in Brass.	Aluminium.
	English Ins.	Centimetres.			Prices.	Prices.
3131	5 by 4	9 by 12	1⅛ in.	6 in.	£5 15 0	£6 10 0
3132	6½ by 4¼	13 by 18	1 4/16 ,,	8 ,,	6 10 0	7 10 0
3133	8¼ ,, 6½	21 ,, 15	2¼ ,,	11 ,,	8 10 0	9 10 0
3134	10 ,, 8	24 ,, 18	2½ ,,	13 ,,	11 10 0	13 0 0
3135	12 ,, 10	30 ,, 24	3 ,,	16 ,,	15 0 0	17 0 0
3136	15 ,, 12	40 ,, 30	3 5/16 ,,	20 ,,	23 0 0	26 0 0

Larger sizes to order.

Watson's Portable Rectilinear Lenses.

For Landscape, Architecture, and copying, giving Wide or Medium Angle according to the stop used.

Nos.	Size of Plates.		Equivalent Focus.	Prices with Iris Diaphragm.
	English inches.	Centimetres.		
3137	5 × 4	12 × 9	5 inches.	£3 0 0
3138	6½ × 4¼	16 × 12½	6 ,,	3 5 0
3139	8 × 5	13 × 18	7 ,,	4 2 6
3140	8½ × 6½	21 × 15	8 ,,	5 0 0
3141	10 × 8	24 × 18	10 ,,	6 0 0
142	12 × 10	30 × 24	12 ,,	7 10 0

All the above Lenses have their Mounts alike, and fit into the same size flange, 1⅛ in. diam.

Watson's Wide-Angle Rectilinear Lenses.

For Interiors and use in Confined Situations.

	Sizes.	Equivalent Focus.	With Rotating Stops.	With Iris Diaphragm.	Aluminium Mounts with Iris Diaphragm.
3143	5 × 4	3 in.	£3 0 0	£3 7 6	£4 0 0
3144	6½ ,, 4¼	4 ,,	3 10 0	3 17 6	4 10 0
3145	8¼ ,, 6½	5¼ ,,	4 0 0	4 10 0	5 5 0
3146	10 ,, 8	6½ ,,	5 0 0	5 10 0	6 5 0
3147	12 ,, 10	8½ ,,	6 0 0	6 15 0	7 15 0
3148	15 ,, 12	10 ,,	7 10 0	8 5 0	9 10 0
3149	18 ,, 16	14 ,,	10 10 0	11 10 0	13 0 0

No. 3143 may be had accurately paired for Stereoscopic work.

Watson's Wide-Angle Single Landscape Lenses.

Yield exceedingly Brilliant Pictures. For Pure Landscape unsurpassed.

	Sizes.	Focus.	Rotating Stops.	Iris Diaphragms.
3150	5 × 4	6 in.	£1 15 0	£2 5 0
3151	6½ ,, 4¼	7½ ,,	2 10 0	3 0 0
3152	8¼ ,, 6½	9 ,,	3 0 0	3 10 0
3153	10 ,, 8	10 ,,	3 15 0	4 5 0
3154	12 ,, 10	12 ,,	4 10 0	5 5 0
3155	15 ,, 12	15 ,,	5 10 0	6 10 0
3156	18 ,, 16	18 ,,	7 0 0	8 0 0

No. 3150 may be had accurately paired for Stereoscopic work.

The above prices are subject to 5 per Cent. Discount for Cash with Order.

W. WATSON & SONS, 313 High Holborn, London, W.C.

THE 'ELLIS'
Portable Studio Stand.



THIS apparatus consists of a complete tripod of usual shape with triangular top, in which form it is available as an ordinary field tripod. In addition, a studio table top is supplied, with tilting and lowering movement by means of an endless screw, and a three-fold base for strutting the legs firmly apart, this base being fitted with castors, covered with indiarubber, on which the whole structure moves. The advantages of a **folding Studio Stand** can be seen at a glance, and will be appreciated by the photographer who has experienced the inconvenience of being called upon to take portraits, etc., away from his studio, and without a studio stand. The legs having sliding adjustment, the camera can be worked either very low down or at its fullest extent. The centre of the triangular top is turned out so that a camera can be placed upon it with the lens projecting through. This will be found very convenient for photographing jewellery and other objects requiring even illumination. The height of the stand is 4 ft. 6 in., and when shut down 2 ft. 6 in. The total weight, with studio top, is 13 lbs.

Our illustrations show the stand in use with a studio camera, and folded ready for packing away in its case. The stand is made in mahogany, polished, and of best workmanship and materials throughout.

PRICE - - £5 : 0 : 0

Canvas Case for carrying, £2.

The above prices are subject to five per cent. discount for cash with order.

W. WATSON & SONS,

313 High Holborn, London, W.C.



OPEN.

CLOSED.

WATSON'S
NEW ALUMINIUM TRIPOD
AS ILLUSTRATED.

Weighs only 1¼ lbs. Price 35s.

3-FOLD STANDS

(As supplied with the Acme Cameras), emphatically the BEST Tourist's Tripod, with mahogany heads, cloth lined :—3213
6-in. tops ... £1 5 0 | 8-in. tops ... £1 10 0
10-in. tops ... £1 15 0

WATSON'S
CYCLISTS' TRIPOD.

Measures when closed only 16 in., and weighs under 2 lb.; exceedingly rigid when set up, *far even beyond the average ordinary solid leg stands.* It folds into four pieces, and the height when opened is 52 inches. It is *the* Stand for small Tourist Cameras.

Price £1 1 0
Improved pattern, with patented sliding legs 1 5 0

These Stands are suitable for any size Camera up to 7½×5.

3214 Specially Heavy Stands, suitable for Large Cameras, as 15×12 and 18×16 Premiers. Made with rigid legs, 56-in. long, and an exceedingly strong 15-in. head, having a mahogany triangular frame and metal centre. It is a most practical Stand for large Cameras, and confidently recommended to those using large Instruments and requiring absolute rigidity 3 15 0

3215 Best Adjustable, Sliding-Leg Tripods, heavy make, with mahogany tops, and brass screw clamps to fix very rigidly. Recommended. 10-in. tops, £2 2s.; 12-in. 2 10 0

3216 Light Folding Tripod, with 4-in head, suitable for ¼-plate or 5×4 Camera 0 10 6

3217 Ditto, ditto, for ¼-plate 0 15 0

CASES FOR TRIPODS.

Solid Leather ... ... For No. 3213, 12s. 6d.; for Nos. 3214, 3215, 20s.
Mail Canvas ... ... „ „ 8s. 6d.; „ „ 15s.

The above Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313 High Holborn, LONDON.

WATSON'S STUDIO SHUTTER.



The most efficient and satisfactory Shutter for use in the Studio, noiseless and without vibration.

THE Shutter which is here shown, closed and open, consists of a metal ring to which are attached two leather bellows, which close together forming a hemisphere.

The action of opening and shutting is done by means of a pneumatic ball; the movement is perfectly noiseless; the pressing of a lever by the side of the ball keeps the shutter permanently open for focussing; on raising the lever the shutter again closes and is ready for use.

On either side of the shutter is a hook, and the method of fitting it is by attaching to a board, which is fastened permanently inside the Camera front. The attachment is made by means of two screws, beneath which the hooks on the shutter are held. Thus the operator can change his lens instantly without removing the shutter.

N.B.—We can confidently recommend this shutter to all Portrait Photographers, to whom we have already supplied a very large number.

PRICE LIST.

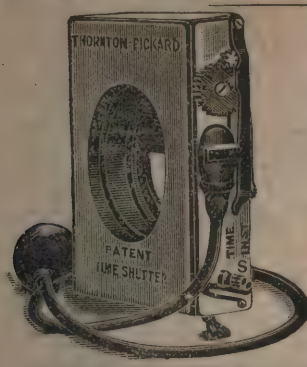
Full Size Opening.			
3 inches	...	...	£1 7 6
4 ,,	...	...	1 10 0
4¾ ,,	...	...	1 15 0
5½ ,,	...	...	2 0 0
6¼ ,,	...	...	2 5 0
8 ,,	...	...	2 15 0

Extra Pneumatic Balls, with latch complete, 3/6. Extra tubing, 5*d.* per foot.

The above prices are subject to 5 per cent. for Cash with Order.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON.

EXPOSURE SHUTTERS.



THORNTON-PICKARD EXPOSURE SHUTTERS

See Thornton-Pickard Co.'s Advertisement, pages 1165-1220.

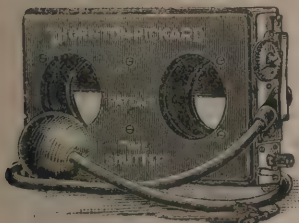
Every type of Shutter by these makers is kept in stock and supplied at List prices.

PRICES, for Time and Instantaneous.

Size of Hood.		Size of Hood.	
1½ inch	18/6	3½ ,, ...	32/6
2 ,, ...	20/6	4 ,, ...	37/6
2½ ,, ...	23/6	4½ ,, ...	42/6
3 inch	27/6	5 ,, ...	47/6

THE THORNTON-PICKARD PATENT STEREOSCOPIC SHUTTER

'TIME' AND 'INSTANTANEOUS.'



Gives exactly equal exposure to each Lens. No vibration.

PRICES, TO FIT A PAIR OF LENSES HAVING HOODS UP TO—

Diameter, inches	1½	2	2½
To give 'Time' and 'Instantaneous' exposures ...	26/-	28/-	31/-

The above prices are up to 3¼ in. Centres.

For 3½ in. Centres, 2/-; 3¾ in., 4/- extra.

When ordering, please give exact size of Hoods and the exact distance apart of the Lenses from centre to centre.

THE THORNTON-PICKARD 'FOCAL PLANE' SHUTTER.

For those who desire to obtain instantaneous photographs of subjects having an extremely rapid movement, such as flying birds, animals, and men leaping, jumping, &c., &c., this is the best shuttter. It gives a shorter exposure and passes a larger percentage of light than any other form.



PRICES OF FOCAL PLANE SHUTTERS.

(Includes fitting to Camera.)

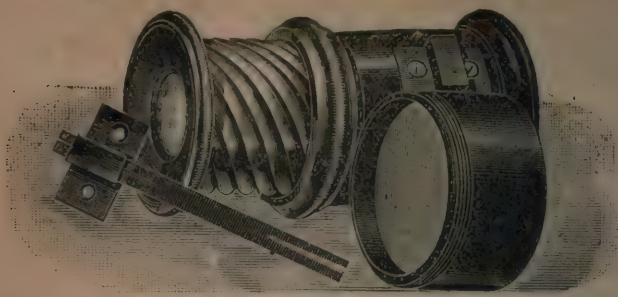
4¼×3¼ (¼-plate)	£1 15 0	8½×6½ (½-plate)	£3 0 0
5 ×4	2 0 0	10 ×8	3 10 0
6½×4¼ (½-plate)	2 5 0	12 ×10	4 10 0
7½×5	2 12 6	15 ×12	5 10 0

When ordering, it is necessary to send a slide for fitting. It is an advantage also to send the Camera when convenient.

The **'FOCAL PLANE'** Shutter, for all sizes, works from about $\frac{1}{25}$ at the slowest to $\frac{1}{1000}$ of a second at the quickest; but, if required, it can be supplied to work at twice these speeds, viz., from about $\frac{1}{150}$ to $\frac{1}{2000}$ of a second.

Speed indicator to any of the above Shutters, 3/6 *extra.*

The above prices are subject to 5 per cent. discount for Cash with order.

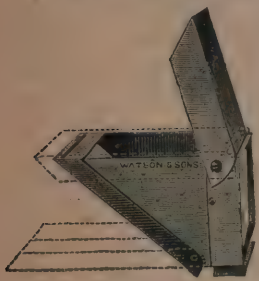


3173

Finders and Focussing Glasses.



3176



3172



3174



3177

3172 The 'Alpha' Finder consists of a concave lens mounted in brass, with a mirror behind it, and shows the object when looked down upon in an upright position. The object may also be seen *through* the Finder by depressing the mirror, which is hinged, for convenience when the Camera is placed on a stand. The Finder is equally good, therefore, for hand or stand purposes, and having no ground glass the image given is a very brilliant one, and increases in strength with the light. With plates for attachment £0 10 6
Ditto, ditto, extra large size 0 17 6

3173 Finder with archimedean screw adjustment for focussing, and with removable back to allow of using the front part alone as a focussing glass 0 12 6

3174 Square Finder, oxidised metal body; very brilliant image can be seen through or looking down on to the Finder 0 6 6
Ditto, ditto, small size 0 5 0

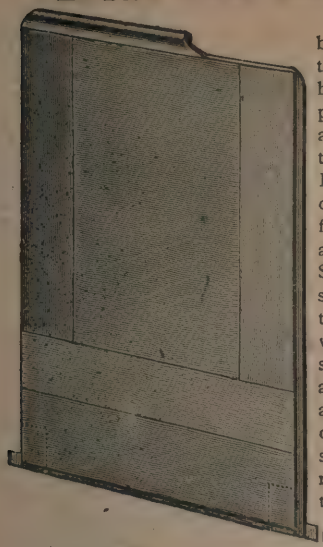
3175 Simple Finder, consisting of deep concave lens, in brass mount, with Camera attachments, rotates to use for either horizontal or vertical views, 'Aptus' pattern 0 2 6

3176 Focussing Glass, small size, with screw clamp 0 5 0

3177 Ditto, ditto, large size 0 7 6

The above prices are subject to 5 per cent. discount for Cash with order.

EXTRA DARK SLIDES FOR CAMERAS.



NOTE. — The Dark Slides quoted below, and all supplied by us, excepting those with the Popular Sets of Apparatus, have now the Shutters fitted with our patent AUTOMATIC SPRING FASTENING at top to keep them closed, and render them not liable to open accidentally. Our IMPROVED FLEXIBLE HINGES, the joints of which overlap one another, and perfectly prevent light passing them under any circumstances, and our PATENT STOPS, which dispense with the ordinary screws that are used generally on shutters to stop them when drawn out, and obviates the necessity of any projection inside or outside the dark slide. The advantages are: the Shutter is stronger and less liable to breakage, the chance of scratching the negative by the screw stops is done away with. Inner Frames require no fitting, there being no projection to allow for.

SIZES. English Inches.	French c/m.	Single Backs.	Double Backs.	Brass-bound extra.
4¼ × 3¼		£0 12 6	£0 15 0	£0 3 6
5 × 4	9 × 12 ...	0 15 0	0 17 0	0 3 6
6½ × 4¾ and 7½ × 4½		0 17 6	1 0 0	0 3 6
8 × 5 and 7½ × 5 ...	18 × 13 ...	0 18 6	1 1 0	0 3 6
8½ × 6½	21 × 15 ...	1 0 0	1 3 6	0 4 0
8½ × 8½ and 9 × 7		1 2 0	1 6 0	0 4 0
10 × 8	24 × 18 ..	1 6 0	1 10 0	0 5 0
10 × 10		1 8 0	1 14 6	0 5 0
12 × 10	30 × 24 ...	1 10 6	1 16 0	0 5 6
12 × 12		1 12 6	1 18 6	0 5 6
15 × 12		2 0 0	2 10 0	0 6 0
15 × 15		2 5 0	2 15 0	0 6 6
18 × 16	30 × 40 ...	3 0 0	3 15 0	0 6 6
18 × 18		3 5 0	4 0 0	0 6 6
22 × 20		4 0 0	5 0 0	0 7 0
22 × 22		4 10 0	5 10 0	0 7 6

The above prices are subject to 5 per cent. discount for Cash with order.

DARK SLIDES FOR FILMS.

We make a special Slide for films, two-thirds the thickness of a Plate Slide, with solid frame, and containing a carrier which is withdrawn from one end, and into which two films are inserted back to back. When in the Slide, the edges are held all round, thus keeping the films quite flat. Prices are as above.

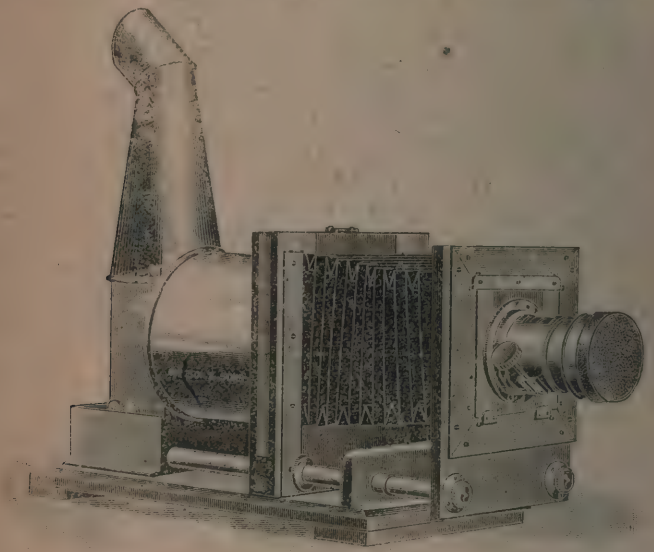
W. W. & S. also manufacture the 'FRAM' FILM SLIDE, designed by C. P. MacCarthy.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON.

WATSON & SONS'

NEW PATTERN

ENLARGING LANTERN.



Made with Mahogany Baseboard and Front, and with Leather Bellows extension.

The mechanical and optical parts of this Lantern are of our highest quality workmanship, a best Compound Condenser and front Lens with rack and pinion for focussing being supplied. The luminant is an Oil Lamp of great brilliauce and has adjustment for focussing.

PRICES COMPLETE AS ILLUSTRATED.

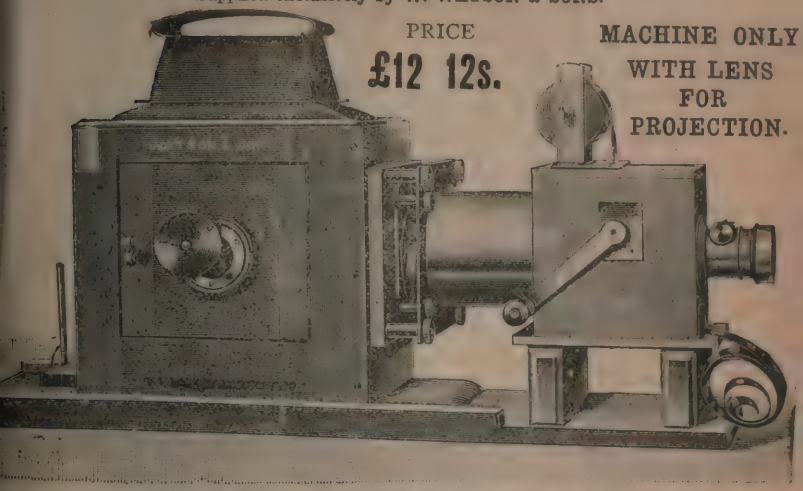
¼-plate with 5½-in. condenser	...	...	...	£7	15 0
5×4 ,, 7-in. ,,	...	...	...	9	10 0
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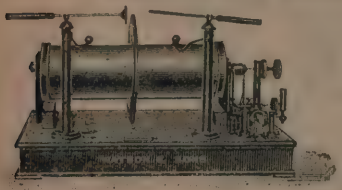
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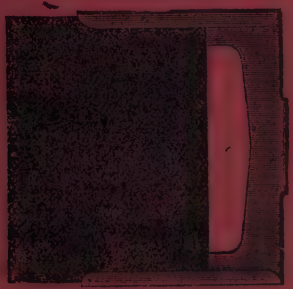
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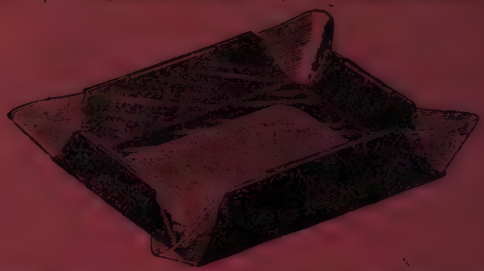
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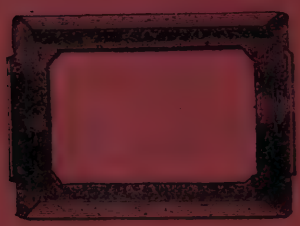
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[*See preceding pages.*

INDEX TO ADVERTISERS.

ADAMS & Co.—Photo Stores 1336 to 1339
Aerograph Company, The—'Aerograph' Air Brush 309
Albion Albumenising Co.—Camera Makers, Dealers, &c. 29
Aldham, E. Laver—Enlargements, Finishing, &c. 305
Allan, David—Manufacturer of Photo Requisites in Metal and Wood ... ... 327 to 334
Anglo-American Photo Import Office—Cinematographs, Films, &c. 1343
Archer & Sons—Optical Magic Lanterns, Slides, &c. 1138
Arundel & Marshall—Light-tight and Parcel-post Boxes, &c. ... 26
Ashford, J.—Patent Adjustable Tripod Stand, Patent Camera, &c. 1402
Autocopyist Company, The—Photo Autocopyist 635
Autotype Co., The—Autotype Tissues and Enlargements, Platinotype Papers, &c. 510

BABAJEE, Sakharam, & Co.—Photo Apparatus, Artists' Colours, &c. 1359
Baird, A. H.—'Lothian' Stereoscope, Todd-Forret Magnesium Flash Lamp, &c. 33
Baker & Rouse Proprietary Limited—Importers of Photo Materials, &c. 1340, 1341
Baker, W. R.—Changing Bag and Developing Tent 287
Barclay & Sons, Ltd.—50/- Hand Camera, Photo Requisites, &c. 308
Barrett, Redmond—Retouching, Painting, &c. (Lessons) 1136
Bates, W.—Photo Black Varnish, and New Dead Black 289
Baynton, C. S.—Photo Depôt ... 1137
Beardsmore, W. J.—Manufacturer of Camera Bellows, Cases, &c.... 290
Beck, R. & J., Ltd.—'Frena' Camera, 'Autograph' Lenses, &c. ... ... 383 to 402
Bemrose & Sons, Ltd.—Photo Process Printers, &c.... 34
Benetfink & Co.—Photo Depôt 414, & 423 to 429
Benton, C. W. & Co.—Collodio-chloride and Gelatino-chloride P.O.P.'s] 1335
Biddle, J.—Photo Material Stores 305
Billcliff, Joshua—Photo Apparatus Manufacturer 503
Birmingham Photo Co., Ltd.—'Criterion' Print-out Paper, &c. 502
Blundell, J., J. J. & T. G.—Residues, Refiners, &c. 529 to 531
Bolas, S. B. & Co.—Collotype Printers 298
Bond, S. P., Ltd.—Photo Stock Dealers 1384
Bramwell, E. & Son—Photo-Chemical Manufacturers 299
Bridge, F. A.—Enlargements, Contact Printing, Lantern Slides, &c. 291
Brin's Oxygen Co., Ltd.—Oxygen, Cylinders, &c. 317
Britannia Works Company, Ltd.—Ilford Plates, P.O.P. Papers, &c. 511 to 526
BRITISH JOURNAL OF PHOTOGRAPHY—Advertisement Scale of Charges 1396
BRITISH JOURNAL OF PHOTOGRAPHY—Notice of Removal 528, 538, 539, 558, and 1395
BRITISH JOURNAL OF PHOTOGRAPHY AND LANTERN RECORD SUPPLEMENT... 1316
BRITISH JOURNAL OF PHOTOGRAPHY—Subscription Scale of Charges ... 1221
BRITISH JOURNAL OF PHOTOGRAPHY 1234
British Photoprint Co., Ltd.—Collotype Printers to the Trade 372
Brooker, A.—Photo and Chemical Stores ... 301
Brooks, William—Collodion Emulsion, &c. 301
Brown, Scott, & Co.—Mounts, Frames, &c. 21, 22, 23
Bruce, T. S.—Retouching, Miniature Painting, Non-Shifting Retouching Medium, &c.... ... 304
Buncle, James—Photo Depôt ... 352
Burr, Charles—New Hand Camera and Stereoscopic Lenses 301
Burrows, T. H.—Dealer in Second-hand Photographic Apparatus 302
Butcher, W. & Son—'Primus' Photo Specialities ... 335 to 338

CADETT & NEALL, Ltd.—Dry Plates... 1407
Chapman, J. T.—Chemicals, and Photo Depôt 501
Clément & Gilmer—Lenses, Cameras, &c. ... ... 1344 to 1351
Cobb, W.—Animatographic Films, 'Reliance' Dry Plates, &c. 540 alternate to 550
Contents Index ... ... 1083 to 1088
Cornthwaite, H.—X.L.C.R. Roller Burnisher, &c. 408

DALLMEYER, J. H., Ltd.—Lenses, Cameras, &c. 1088, and 1403 to 1406

Damoder, Madhowrao, Dukle, & Co. — Photographic, Drawing and Artists' Materials 1360
Darlot, A.—Lenses, Cameras, &c. 1352
David, Miss—Retouching 296
Day, Edward—Refiner, Residues, &c. 305
Day, Joseph—Portable Stereoscope 288
Demaria Frères—Lenses, Cameras, &c. 1354
Dewey, Alfred—The Gem Shutter 300
Dobsons & Curtis Bros., Ltd.—The 'Trinity' Hand Camera, and Outfits 373
Dukle, D., M., & Co.—Photographic, Drawing, and Artists Materials 1360
Dunmore, Edward — Photographer's Companion ... 1146, 1163

EASTMAN Photo Materials Co., Limited—Eastman Papers and Films, KODAK Cameras, &c. 319 to 326, and ... ... 990 to 1017
Edwards, B. J. & Co.—Isochromatic Plates, Films, Papers, &c. 541 alternate to 551, and 1125 to 1132
Edwards, Austin—Films, Film Competition 1304, 1305
Elliott & Son — Plates, Films, Papers, Enlargements, &c. 559 to 572, also 1006 to 1017, and extra 2 pages... ... ... 562a, 563a
Ellis, Alfred—'Paragon' Retouching Medium 297
Emery, Wilfred — Retouching, Printing, Enlarging, Apparatus, &c. 297
Endolithic Ivory Co., Ltd.—Ivory Tablets and Discs 28
Epstein & Co.—Frames, Mounts, Mouldings, &c. 297
European Blair Camera Co., Ltd.—Hand Cameras, Films, &c. 344, 345

FALLOWFIELD, J.—Photo Stores ... ... 227 to 258
Field, R. & Co.—Watkins' Exposure Meters, and Eikronometer, Patent Silver Lantern Screen, &c. ... ... 367 and 1235
Fincham, Philip H.—Optical-Lantern Slides, &c. ... 299
Fitch & Co.—Films, Celluloid, &c. 1091, 1092
Flinsch, Ferdinand—Emulsion Coating Machines ... 1358
Fuerst Bros.—Lumière's Cinematograph, Plates and Papers, Developers, &c. 409

GANDOLFI, Louis — Cameras, Stands, Outfits, &c.... 366
'Gem' Dry Plate Co., Ltd, The—Dry Plates 403
Gennert, G.—Photographic Stores 1365 to 1380
Gorde, A.—'Synoscope' Lens ... 1384
Green, W.—Carbon-Film Cloud Negatives... 296
Greenwood, Henry, & Co.—Publishers 528, 538, 539, 558, 1221, 1316, 1395, 1396
Griffiths, W. & Co., Ltd.—'Cyclist' Lantern Slide, &c., Cameras ... 304
Guerry, Cl.—Single and Double-Flap Pneumatic Shutters 1353
Guiterman, S. & Co.—Celluloid, and Rollable Film 294

HAMPTON & Co.—Photographic Books 300
Hardtmuth, L. & C.—Koh-I-Noor Retouching Pencils 354
Hastings & Miller 1335
Hayes, F. T.—Artist and Enlarger 352
Henderson, James—Importer of Photo and Optical Goods ... 305
Hicks, John A.—Enlargements, &c. 343
Hinton & Co.—Photo Stores, and Chemists ... ... 410 to 413
Hoather, W. H.—Platinotype Printing 352
Hoffman, G. L.—Printing, Retouching, Enlarging, &c. 297
Hogg, David H.—Importer of Photo Goods 1384
Holmes Bros.—Photo Apparatus 404
Horne & Thornthwaite—Photo Apparatus and Materials ... 300
Houghton, Geo. & Son—Photo Manufacturers and Dealers 375 to 382
Howes, R. W. — Enlargements, Backgrounds, &c. 307
Hoyles, A. E. & Co.—Backgrounds and Accessories 1303
Hudlass, F. W.—The 'Pneu' Hand Camera 408
Hughes, W. C.—Lanterns, Condensers, Moto-photoscope, &c. 368 to 371
Hülsen, Julius, & Co.—Hyposulphite of Soda 288
Hume, Wm.—Cantilever Enlarging Apparatus, Objectives, Outfits, &c. ... ... 1225 to 1233
Hüttig, R. & Son—Photo Materials, &c. 1382

ICONOSCOPE, The American ... 1382
Illingworth, Thos., & Co.—Enlargements, Backgrounds, Finishing, &c. 532 to 537, and 1148, 1149
Index to Contributors ... 1083 to 1088
Index to Postal and Telegraphic Addresses ... ... 1139 to 1146
Infallible Exposure Meter Co.—Exposure and Print Meters 350, 351

JOLLES, Dr., Lilienfeld & Co.—Protalbin Paper 1364

KEENE, Richard, Ltd.—Platinotype Printing, &c. ... 299
King, W. & Co.—Enlargements, Printing, Retouching, &c. 1302, 1303
Knox, Adam & Sons—The Knox Enameller, Rolling Presses, &c. 313
Koch, Achim—Backgrounds ... 316
König, Otto, & Co.—Photo Papers 24, 25, and 1356, 1357

LANCASTER, J. & Son—Lenses, Cameras, Outfits, &c. 430 to 494
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Liesegang, Ed.—Aristotype Paper, Publisher, &c. 1355
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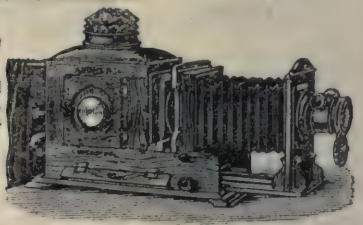
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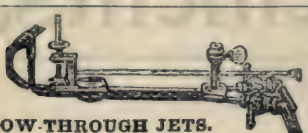
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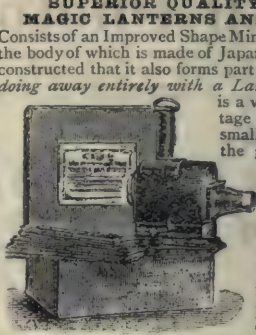


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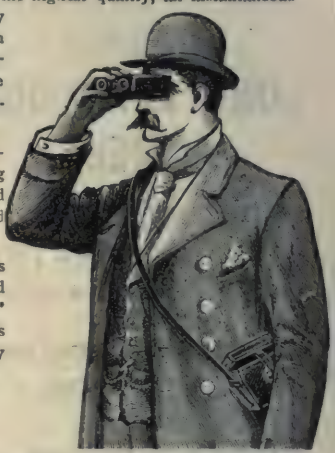
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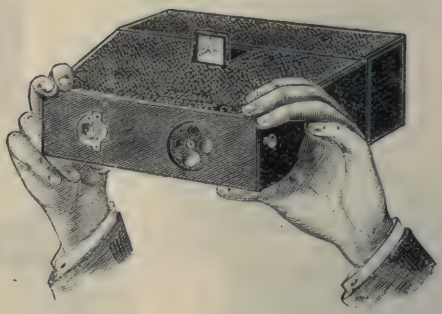
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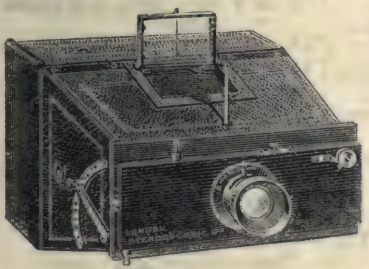
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YOU PRESS A SMALL TRIGGER } TO CHANGE THE PLATE OR FILM.

Seventeen good Reasons for buying the Twin-lens 'Carlton' Camera.

1. It gives power to focus for any distance near and far.
2. It has a FULL size finder.
3. It shows the exact size of the image.
4. It has Lenses working at *f*/5·6.
5. It has Iris Diaphragm to working [lens.
6. It has a safety shutter.
7. It has a pneumatic control for all speeds.
8. It gives Time and Instantaneous exposures.
9. It holds Twelve Plates or Films.
10. It Registers the number of Plates taken.
11. It can be used as a Stand or Hand Camera.
12. Exposed Plates can be developed without disturbing those unused.
13. It is small, light, and perfectly constructed.
14. It will stand extremes of climate.
15. It is an expert's camera.
16. It is so simple that a beginner can use it successfully.
17. Workmanship and advantages considered, it is the cheapest Twin Lens Camera in the market.

HAVE YOU READ } **'TWIN LENS CAMERAS. What they are, and How to use them?'**

Sent post free on receipt of post card.

PRICES of the TWIN-LENS 'CARLTON.'

With Euryscope Lenses, and all other advantages as detailed above.

To carry Twelve Plates or Twelve Films,	4¼×3¼	...	...	...	£12	12	0 Net.
" " " " "	5 ×4	...	...	...	15	15	0 "
" " " " "	6½×4¾	...	...	...	21	0	0 "

FREE LESSONS ARE GIVEN WITH THE CAMERA,
Or Full Instructions sent with each instrument.

THE STEREOSCOPIC COMPANY,

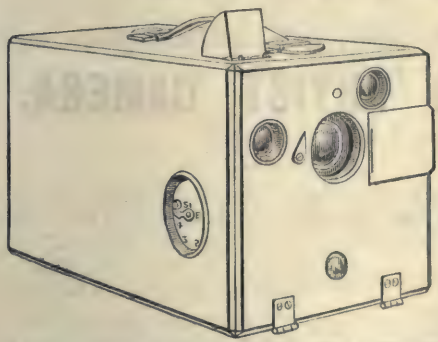
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[*See preceding and following pages.*

The STEREOSCOPIC COMPANY'S

'CARLTON'

Hand Camera



Now well known as one of the smallest self-contained Hand Cameras carrying plates or films, has been greatly improved and brought up to date, with Speed Indicator giving all rapidities from 1 second to $\frac{1}{100}$th and Time Exposures.

The Mechanical means of Changing is by pressure of a small button only. IT CANNOT FAIL.

All working parts are of metal. The body is of well-seasoned Mahogany covered with leather. The Lens is the Company's Black Band Rapid Rectilinear. The Lens is fitted with Revolving or Iris Diaphragm. The Price is more than moderate, quality considered.

PRICES: Quarter-plate, complete, £8 8; 5×4, £10 10; Half, £15 15.

Free Lessons

WEST-END AGENTS
for BECK'S Celebrated

FRENA

CAMERAS.

Sizes ...	oo	o	½-pl.	5×4.
Prices..	58/8	105/-	177/6	252/-

READY FOR IMMEDIATE DELIVERY.

Free Lessons

THE STEREOSCOPIC COMPANY,

106 and 108 REGENT ST., W., and 54 Cheapside, E.C.

[*See preceding and following pages.*

THE SMALLEST TWIN-LENS CAMERA IN THE WORLD

Is the . . .

STEREOSCOPIC COMPANY'S 1898 IMPROVED

TWIN LENS 'ARTIST' CAMERA.

BY ROYAL LETTERS PATENT.

THE IMPROVED 'ARTIST' TWIN-LENS CAMERA is without question the **Smallest in the World,** and is made of the very finest Mahogany, carefully covered in Morocco leather, and fitted with a *Full-size Finder and an ordinary Focussing Screen in addition.* There are 3 Double Dark Slides of excellent make and design, or a Changing-box taking 12 Plates or 20 Films, a pair of 'Black Band' Rapid Euryscope Lenses working at *f* 5·6, and a Thornton-Pickard Shutter, with Time and Instantaneous movements and speed regulator, and which can be removed at will, or a Bausch & Lomb ditto. There is a strap for carrying the Camera round the neck when in use, so as to leave the hands at liberty.



It Measures only 5¼ × 6 × 6½ inches, and Weighs 4 lbs.,
Including 3 Slides, 2 Lenses, and Shutter, and

COSTS - - - £14 14s. inclusive.

TAKING PICTURES 4¼ × 3¼.

Solid Leather Case, with lock, key, and handle, 25s. extra.

ALSO MADE IN 5 × 4 SIZE, £16 16s.
6½ × 4¾, £21.

THE LONDON STEREOSCOPIC & PHOTOGRAPHIC COMPANY, Ltd.

106 & 108 Regent Street, W., and 54 Cheapside, E.C.

[*See preceding and following pages.*

BY ROYAL  LETTERS PATENT.

IMPORTANT ANNOUNCEMENT.

THE Camera described on the opposite page can be supplied with a new & extremely simple Magazine carrying 12 Glass Plates or 24 Films, the addition to the size of the Camera being about one inch only.

☛ THE SMALLEST TWIN LENS CAMERA.

With or without Magazine.

THE LONDON STEREOSCOPIC CO.

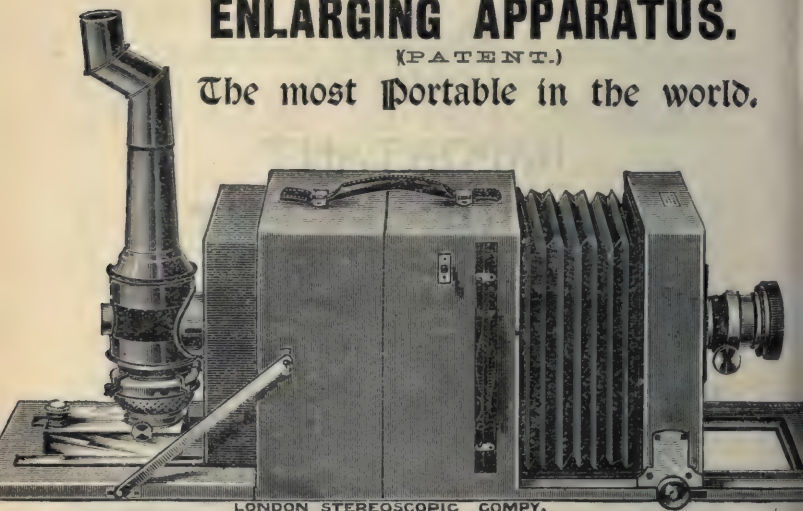
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THE LONDON STEREOSCOPIC COMPANY'S
NEW 'BLACK BAND'
ENLARGING APPARATUS.

(PATENT.)

The most Portable in the world.



LONDON STEREOSCOPIC COMPY.

BY a novel arrangement of the working parts, a considerable saving in space and weight has been effected, and, at the same time, increased facility in working has been obtained. When not in use the lamp is packed inside the focussing chamber, and the whole apparatus closes up into a plain rectangular box, with no projection larger than the focussing screw.

A Patent Plate Holder is supplied which permits any desired portion of the Negative to be brought opposite the centre of the Condenser.

The Lamp is of the most approved construction, and gives a brilliant light without smoke or disagreeable odour, but Lime Light or Incandescent Gas can be fitted if desired.

Price, including objective, with 5½ in. Condensers, £10 10s.; 8 in., £15 15s.; 10 in., £18 18s.

The Stereoscopic Company would like their patrons to understand that the above Enlarging Lanterns are made and finished with the same scrupulous care that they devote to all their best camera work, and can with confidence be taken to India or any other hot climate without the extra cost of brass binding.

May be seen in operation at 106 and 108 Regent Street, W.

THE STEREOSCOPIC COMPANY,

106 and 108 REGENT ST., W., and 54 Cheapside, E.C.

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DAYLIGHT ENLARGING SIMPLIFIED.

THE

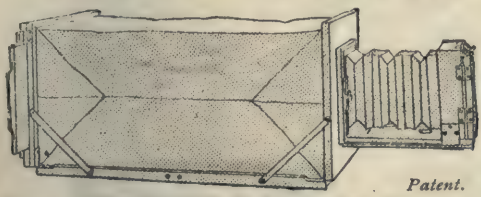
'SNAP SHOT ENLARGER'

(By Royal Letters Patent)

PROMISES TO REVOLUTIONISE AMATEUR PHOTOGRAPHY.

By its use a ¼-plate camera is placed on a level with a whole-plate, while 5 × 4 and ½-plate negatives give ⅛ and ⅛ pictures respectively.

NO FOCUSSING. NO ADJUSTMENT. NO TROUBLE

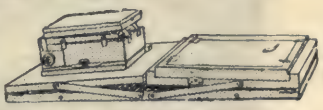


Patent.

Fig. 1.—**THE SNAP SHOT ENLARGER** (Section).

The annexed illustrations are self-explanatory. The apparatus has only to be set up as shown in Fig. 1. The negative is inserted at one end and the enlarging paper at the other.

The Shutter is then drawn and the apparatus pointed up to the sky. The exposure is made by means of the flap E. Fig. 2 shows the apparatus closed.



Patent.

Fig. 2.—**THE SNAP SHOT ENLARGER** (Closed).

PRICES.

No. 1.	'Snap Shot' Enlarger, ebonized, fitted with best quality single achromatic lens to enlarge from 3¼ × 3¼ to 8½ × 6½	4	4	0
,,	Ditto with best Rectilinear lens	5	5	0
,,	Ditto polished mahogany	6	6	0
No. 2.	'Snap Shot' Enlarger, to enlarge from plates 4¼ × 3¼ to 8½ × 6½, with best quality single achromatic lens	4	14	6
,,	with best rapid Rectilinear lens	5	15	6
,,	in best mahogany	6	16	6
No. 3.	'Snap Shot' Enlarger with best Black Band R.R. lens, to enlarge from 5 × 4 to 10 × 8	8	8	0
No. 4.	'Snap Shot' Enlarger, fitted as No. 3, to enlarge from ½-plate to 12 × 10	10	10	0

Descriptive Pamphlet Free on Application.

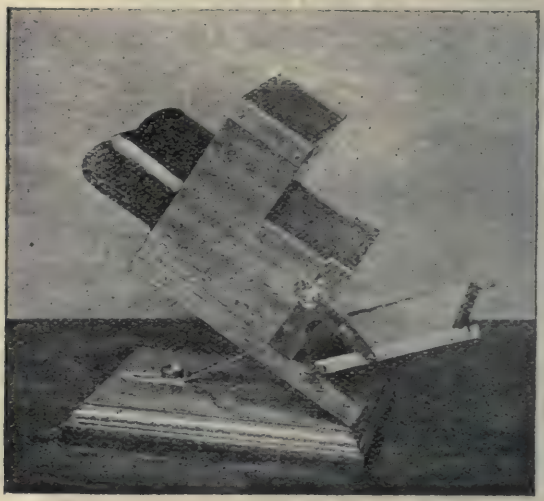
THE STEREOSCOPIC COMPANY,

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[*See preceding and following pages.*

THE KRŌMSKŌP

Shows the Photographs in NATURAL COLOURS.



The STEREOSCOPIC COMPANY have been appointed West End Agents for, and keep a very large stock of, Professor Ives' new and beautiful instrument known as **The 'KROMSKOP.'** An instrument which, with almost equal simplicity, records and reproduces colours far more perfectly than the Phonograph records and reproduces sounds.

The KROMSKOP is invaluable for . . .

EVENING PARTIES, AT HOMES, CONVERSAZIONES, GARDEN PARTIES, &c., &c., and is the most beautiful invention of the Nineteenth Century.

The Price of KROMSKOP Complete in Case and Six Kromgrams, **£7 7s.**

Extra Kromgrams 5s. each. **Special Trade Terms on Application.**

THE LONDON STEREOSCOPIC COMPANY,

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☛ CAN BE SEEN IN USE AT ABOVE ADDRESS. ☚

[*See preceding pages*

THE

Photographer's Companion

BEING A COLLECTION OF

HINTS, EXPEDIENTS, AND FORMULÆ,

SYSTEMATICALLY ARRANGED AS
A SUPPLEMENTARY REFERENCE BOOK FOR USE
IN THE STUDIO AND DARK-ROOM.

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EDWARD DUNMORE.

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Winners of Medals at Seven Exhibitions.

Manufacturers of New Cameras and all Photographic Apparatus; and Dealers in New and **Second-hand** Cameras and Lenses by Dallmeyer, Ross, Watson, and all the leading makers.

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Largest and most varied stock of genuine high-quality Second-hand Apparatus in this country.

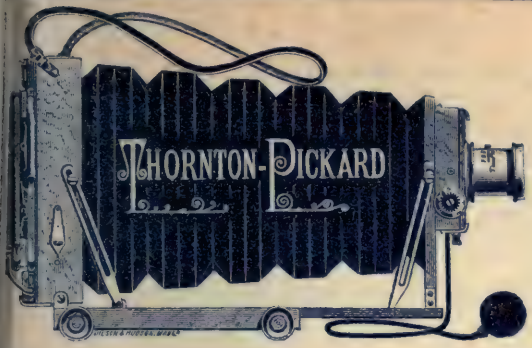
New and correct lists are published several times each year, and are sent **post free upon application.**

Our prices compare favourably with any other Dealer, and our Goods may be relied on.

Many of the new Zeiss and Goerz Lenses, and all other Leading Makers.

All our Lenses are guaranteed genuine and in first-class order, unless advertised as otherwise.

SEND FOR COMPLETE LIST.



1898.

Catalogue

OF

THE

THORNTON-PICKARD

PATENT

CAMERAS,

SHUTTERS,

And other Specialties.

May be obtained from all Dealers in Photographic Materials, or direct from

The Thornton-Pickard Manufacturing Co., Ltd., Altrincham.



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A discount of 5 per cent. will be allowed from the prices of all Goods of our manufacture for cash with order.

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THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.



JUMPING FOR STICK.

Exposure 1/100 sec. Taken by Mr. J. E. Thornton, with a

THORNTON-PICKARD CAMERA AND FOCAL PLANE SHUTTER.



EXPECTATION.

Exposure $\frac{1}{25}$ sec. Taken by Mr. J. E. Thornton, with a

THORNTON-PICKARD CAMERA & TIME & INSTANTANEOUS SHUTTE

OPYRIGHT

Introduction.

THE THORNTON-PICKARD SHUTTERS.

THERE are doubtless few, if any, practical photographers at the present day who would question the superiority of the Roller Blind Shutter over every other type; and no doubt all who have carefully studied the theory, construction, and practical use of various kinds of Shutters are agreed that there is no other form so satisfactory and reliable. It is now some years since we became convinced of this fact, since which we have made it our business to improve and perfect this particular form of Shutter, and to make it THE SHUTTER OF THE DAY. How far we have succeeded may be judged from the fact that the Thornton-Pickard Shutters have

THE LARGEST SALE IN THE WORLD.

THE introduction of our Patent Time and Instantaneous Shutter made it possible to give *any* exposure, from fractions of a second up to minutes or hours, *without vibration*, and therefore to dispense with the use of the lens cap entirely. This Shutter is used for *all kinds of work*, both by professional and amateur photographers.

The merits of the Thornton-Pickard Patent Time and Inst. Shutter are so widely known that it is unnecessary to dwell upon them here. We may, however, mention that last season's sales again show an enormous increase upon previous records—another proof of this Shutter's sterling quality and suitability for its purpose.

For the information of those who may not have studied the matter, we beg to offer the following remarks upon the

Requirements of a Perfect Shutter:

IT should be simple in construction and not liable to get out of order; it should be well made and carefully fitted; it should work without vibration, or the picture will be blurred and the lens will eventually suffer by the constant jar; there should be no sudden reversal of the moving parts, they should be light and well-balanced, and travel in one direction only, otherwise vibration will be unavoidable; the Shutter should work equally well in front of or behind the lens, and upside down, sideways, or in any other position; it should be safe and not liable to go off accidentally; it should give even illumination all over the picture; it should open instantly, remain completely open for the greater part of the exposure, and then close instantly; the "Time" exposure should be completely under the control of the operator, so that should the subject show signs of movement he can close the Shutter by the pneumatic ball instantly, and so prevent the picture being blurred; the release should work with *one* squeeze of the pneumatic ball, so that short exposures (such for instance as 1-4th, 1-6th, or 1-10th of a second which would be too quick to get with a lens cap, and too slow to get with an instantaneous Shutter) may be obtained by squeezing the ball to open the Shutter, and letting it go quickly to close; these short exposures cannot be got when two squeezes are necessary. Both in theory and practice the above points are necessary in a perfect Shutter for all-round work. *The Thornton-Pickard Time and Instantaneous Shutter possesses every one of them.*

BEWARE OF IMITATIONS. LOOK FOR THE NAME

THORNTON-PICKARD

All our goods bear our name. None genuine without.

THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

Time & Instantaneous Shutter.



Standard Pattern.

To fit on either the Hood or Tube of the Lens.

*

Particulars of the smallest size:

Price 18/6.

SPEED, up to $\frac{1}{75}$ of a second.
DIMENSIONS, $3\frac{3}{8}$ x $2\frac{3}{4}$ x $\frac{7}{8}$ inches.
WEIGHT, $4\frac{1}{2}$ ozs.
Price List on page 46.

***Speed Indicator, 3/6 extra.**

*

THE above illustration shows the external appearance of the THORNTON-PICKARD Time and Instantaneous Shutter, which is the one recommended for general all-round work.

The Shutter is simplicity itself.

There is no complicated mechanism to get out of order.

It is a perfect substitute for the lens cap, and much more handy and reliable.

The same Shutter may be used with any number of lenses, of different sizes, by the use of our Patent Adaptors (price from 8d. each) described on page 19.

The Shutter is fully described on the two following pages.

**When a Speed Indicator is not fitted, an ivory label is attached to every Shutter showing the highest, medium, and lowest speed at which the Shutter will work for Instantaneous Exposures.*

Price List on page 46.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

Patent Time & Instantaneous Shutter, Standard Pattern—(*continued*).

THE illustration below shows the Shutter in section, and the one on the preceding page shows its external appearance. In the interior of the case (which is made of mahogany of a rich dark colour and is nicely polished and finished) there are two rollers A and B, one at the top and the other at the bottom. A piece of flexible and perfectly light-proof cloth D, the full width of the case, is joined at its opposite ends to these rollers, so that it can be wound off one on to the other like a blind or curtain. Midway in the blind a rectangular hole is cut, somewhat larger than the lens hood; this is indicated by the thick dotted line H. The interior of the bottom roller contains a spiral spring, made of the best fine steel wire. This spring can be wound up to increase the speed by the knob S (shown in the illustration on the preceding page). The spring catch (shown in the same illustration) drops into a notch cut in the knob, for the purpose of holding it when wound up. A slight downward pressure on this catch will allow the spring to run down to its lowest tension. After letting the driving spring run down to the lowest, one or two turns should be given to the knob, if necessary, so as to put sufficient tension on the spring to just pull the blind down. This remark does not apply if the Shutter is fitted with a Speed Indicator, as the latter forms a stop and prevents the spring from unwinding too far and also from overwinding. At the end of the top roller is a small pinion, which works into a toothed wheel on the outside of the case. The arm, or pointer, also seen in the engraving, may be placed at "TIME" or "INST." When the Shutter is worked with the pointer at "Inst.," as shown, it keeps clear of the wheel, and allows the blind to run to the bottom, giving an instantaneous exposure; but if the pointer is placed at "Time," the wheel is stopped by means of a projecting stud, which causes the half-unwound blind to remain open and give a prolonged exposure until the ball is released. At the end of the top roller, inside the case, there is a pulley P, on to which the cord C winds. This cord, which is made specially strong for the purpose, terminates in a small tassel. The Shutter has a large round aperture through it from back to front. The back part is recessed, and is lined with a piece of Patent Rubber Moulding R, of special form for the purpose of accurately fitting the lens. Should the fit be rather too slack, it may be made tighter by turning an adjusting screw at the side of the Shutter not shown in the engraving.



The action of the Shutter is as follows:—

For an Instantaneous Exposure place the lever opposite the word INST. The cord is then pulled out as far as it will come by means of the tassel, which causes the wheel to revolve until the second stud catches in the notch of the lever, making two clicks. The pulling of the cord winds up the blind on the top roller, so that the opaque bottom end covers the opening and consequently the lens. If, now, the pneumatic ball is pressed, it will lift the lever clear of the stud and release the wheel, allowing the blind to rapidly re-wind upon the bottom spring roller. The aperture in the blind therefore passes rapidly across the opening in the Shutter case, which is instantly covered again by the opaque end of the blind. The exposure thus given is an instantaneous one.

The Duration of the Exposure can be ascertained by counting the number of turns given to the speed knob S, and referring to the ivory label on the side of the Shutter, which gives the highest, lowest, and the medium speed. Intermediate numbers of turns may be given to the speed knob, which will give intermediate speeds. To obtain the lowest speed, represented by "0" turns, the spring is allowed to run down, and then re-wound up by the knob a sufficient number of turns to only just carry the blind to the bottom and so close the Shutter. For a small extra charge the Shutter is fitted with a SPEED



[*Continued on next page.*

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

Patent Time & Instantaneous Shutter, Standard Pattern—(*continued*).

INDICATOR, shown in the accompanying illustration, also on page 20. This consists of a dial, marked in fractions of a second, attached to the side of the Shutter, and a pointer on the end of the spring-roller spindle. The speed is indicated on the dial in fractions of a second by the pointer, which can be set to the speed desired by means of the knob. The Indicator is a great acquisition; it does not retard or affect the working of the Shutter in any way, and is strongly recommended.

The speeds of each size of Shutter have been arrived at after a series of very careful tests with apparatus constructed specially for the purpose.

For Time Exposures the cord is pulled to its limit as before, but the lever is placed opposite the word "TIME." On squeezing the pneumatic ball the blind stops open by means of the stud, which catches in the notch of the lever as before described; it remains open until the pressure on the ball is released. Thus a Time exposure of any required duration may be given. In this case the exposure commences instantly the ball is squeezed, and terminates immediately the pressure is released. Beyond this there is no limit to the duration of the exposures that may be obtained.

For very long Exposures, such, for instance, as are required for INTERIORS, there is no necessity to hold the ball all the time. Without first setting the Shutter, pull the cord *half-way*, that is, until the first click is heard. This sets the Shutter full open, and it may be left so for the desired time of exposure, after which it can be closed by simply squeezing the ball.

For Focussing, the Shutter remains open in the same manner, that is if the cord is pulled only half-way—until the first click is heard.



BUTTON RELEASE.

For Hand Cameras. This Shutter is very suitable for HAND CAMERAS. It may be fitted in front or behind the lens, and sideways or upside down. It is equally efficient in any position, and gives all exposures from fractions of a second up to any desired length of prolonged "Time" exposures. It is quickly adjusted, and free from vibration. The winding or setting cord of the Shutter is left extra long, so that it may be cut to the desired length after fitting to the Camera. When the Shutter is fitted with a cord and Button Release, as shown in the engraving, the price is 1/- less. See Price List at the end.

TESTIMONIALS.

"Its action is really admirable, the mechanism being both ingenious and simple. It is well made, and the various actions are effected without any jar."—*British Journal of Photography.*

"I have used your Shutters since '88; they were the best then, and have been improving ever since."—W. H.

"Your Shutters are the best in the market by far."—A. BROS.

"I find absolutely no vibration in either the Time or Instantaneous movements, freedom from which I have found in no other Shutter (and they are many) that I have tried."—F. D., India.

"I work with no other. It never fails me, and there is no vibration. This Shutter is especially good for India, as there is nothing to rust about it."—*Journal of the Photo Society of India.*

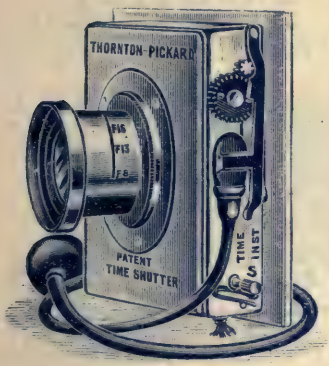
"I have now had this Shutter for several years, and have found it to work most successfully."—Rev. B. W. B.

"I have had this Shutter over four years, and have used it many hundreds of times, and it has never failed me. When I got the Shutter several of my friends prophesied that it would not stand this tropical climate, but I am pleased to say that it has done all that could be desired. It was the first of its class to come out here, and now there are several dozens in the settlements, and I have not heard of one failing."—A. W. B., Singapore.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

Behind-Lens Shutter.

Time and Instantaneous.



THIS Shutter is of exactly the same construction as the Standard Pattern, but is arranged to be screwed to the panel of the Camera front, as in the illustrations of our "Amber" and "Ruby" Cameras, practically acting as an inside Shutter. It then forms a part of the Camera, and is always firmly attached and in position. The back is fitted with velvet, which insures a light-tight joint when the Shutter is screwed to the panel of the Camera front. The lens flange is screwed to a detachable panel which fits into the front of the Shutter. Extra panels for other flanges may be had, so that any number of lenses may be used with the same Shutter, and any one instantly dropped into its place ready for immediate use.

PRICE from 21/-

Speed Indicator, 3/6 extra.

Price List, page 46.

Other Patterns of Shutters made as Behind-Lens Shutters to order, price from **2/6** extra.

The Shutter should be attached to the Camera front panel by four ordinary small screws passed through from the back of the panel into the velvet-covered back of the Shutter. Care should be taken that these screws are not too long so as to injure the blind.

TESTIMONIAL.

"It may interest you to know that this Shutter has travelled nearly all round the World, and was in constant daily use for eighteen months in the tropics, answering its purposes perfectly on every occasion."—G. F. R.

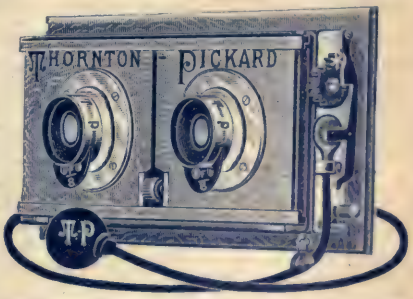
* * *

Patent

Stereoscopic Behind-Lens Shutter,

With Adjustable Panels.

For particulars see next page.



THE THORNTON-PICKARD MANUFACTURING CO. LTD.

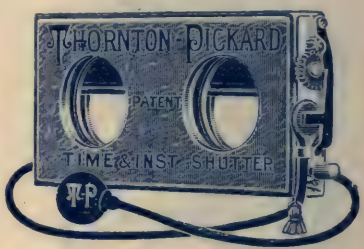
Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

Stereoscopic Time and Instantaneous Shutter.

To fit on the Hoods or Tubes of Lenses.

FOR Stereoscopic work a good Time and Inst. Shutter is an *absolute necessity*. This is the Simplest and the Best Shutter for the purpose. It is constructed upon exactly the same lines as the Standard Pattern Time and Inst. Shutter, of which a detailed description is given on pages 6 to 8. It has a great range of speed for Instantaneous Exposures, in addition to Time Exposures, and will, therefore, give any exposure from fractions of a second up to minutes or hours. The exposure is exactly the same to each lens, and there is NO VIBRATION.



THIS SHUTTER IS UNEQUALLED FOR STEREOSCOPIC WORK.

Particulars of the Smallest Size:

Price 26/-

SPEED, up to $\frac{1}{50}$ of a second.
DIMENSIONS, $3\frac{1}{4}$ x $6\frac{1}{2}$ x 1 inches.
WEIGHT, 8 ozs.
Price List and Instructions for ordering, pages 46 and 47.

Speed Indicator, 3/6 extra.

BEHIND-LENS Stereoscopic Shutter (For Engraving, see page 9.)

For both Single and Stereoscopic Lenses.

THIS is a special form of the above Shutter to be attached to Camera Front. The lenses are mounted upon a detachable panel that fits into the front of the Shutter. The Shutter therefore works behind the lenses, practically forming an Inside Shutter, and is always in position ready for work. The detachable panel can be removed when it is desired to substitute another lens. The opening in the blind being the full width of the Shutter permits the using of either a pair of lenses for Stereoscopic work, or a single lens opposite the centre of the plate for ordinary views.

Price, with One Panel, from **29/6.** Extra Panels, **2/-** each.
Speed Indicator, **3/6** extra. *Price List, page 46.*

PANEL WITH ADJUSTABLE CENTRES.

IN this pattern the panel carries two smaller panels to which the lens flanges are attached. By turning a small knob the distance between the centres can be varied from $2\frac{3}{4}$ to $3\frac{1}{4}$ inches.

Price 5/- *Price List, page 46.*

Self-Capping Blind.

FITTED TO

TIME AND INSTANTANEOUS,

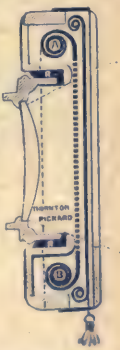
OR

SNAP SHOT SHUTTER.

Covers the Lens whilst Setting the Shutter.

The Cord runs back into the Shutter after Setting.

THIS makes an exceedingly useful Shutter for Hand Cameras, which is unequalled for that class of work. The setting cord runs back into the case when the Shutter is set, which is a very great advantage. The Self-Capping Blind automatically covers the lens whilst setting the Shutter for the next exposure, and then springs back again; thus the sensitive plate may always remain uncovered in the Camera for immediate use. It is specially necessary when using a magazine or roll-holder with the Camera. The accompanying illustration shows a section of the Shutter. The exposing blind is indicated by the dotted line, and the Self-Capping Blind is shown by the thick black line immediately in front of the exposing blind. When the cord is pulled both blinds wind up together, the Self-Capping Blind covering the opening in the other. When the cord is released the Self-Capping Blind immediately rewinds into its former position, the setting cord goes into the case, and the exposing blind protects the plate from light until the exposure is made. The Shutter is very compact, measuring only $1\frac{1}{8}$ inches thick.



The following particulars relate to the Time and Instantaneous (Standard Pattern) when fitted with Self-Capping Blind:—

Particulars of the smallest size Shutter fitted with Self-Capping Blind:

SPEED, up to $\frac{1}{70}$ of a second.

DIMENSIONS, $3\frac{1}{2}$ x $3\frac{3}{8}$ x $1\frac{1}{8}$.

WEIGHT, 6 ozs.

Price of the Self-Capping Blind, from 5/- to 7/6 Extra, with either Time and Instantaneous or Snap Shot Shutters, see Price List, page 47.

A Speed Indicator is strongly recommended with this form of Shutter, 3/6 extra.

The Self-Capping Blind is fitted to the Snap Shot pattern also. This is equal to the Time and Instantaneous Shutter when prolonged exposures are not required, and is a very good Shutter.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

PATENT

Snap Shot Shutter.



Particulars of the smallest size:

Price 10/-

SPEED, up to $\frac{1}{50}$ of a second.
DIMENSIONS, $3\frac{3}{8} \times 2\frac{3}{4} \times \frac{7}{8}$ inches.
WEIGHT, $4\frac{1}{2}$ ozs.
Price List page 46.

Speed Indicator, 3/6 extra.

For all kinds of Instantaneous Subjects. It is the Simplest. It is the Cheapest and Most Efficient. It is well made and beautifully finished.

AS its name implies, this is an Instantaneous Shutter. It has the merit of great simplicity, coupled with a great range of speed.



LIKE the Thornton-Pickard Time and Instantaneous Shutter it is made upon the roller-blind principle, and is therefore absolutely free from vibration when working. Although low in price, it is just as well made and finished. The motive power is obtained by a spiral spring made of the best fine steel wire.

THE general construction and working of the Shutter will be readily understood by reference to the description to the Time and Instantaneous Shutter (Standard Pattern) the main point of difference being that this Shutter is not adapted for prolonged Time exposures. For Instantaneous work it is all that can be desired, and is readily adjusted for various speeds.

THE Speed Indicator, illustrated above, is strongly recommended. It shows the speed of the Shutter at a glance.

For **Hand Cameras** this Shutter is very suitable, and when required is fitted with special form of release and Self-Capping Blind, as described for Time and Inst. Shutter on page 11.

No Vibration with the Snap Shot Shutter.

The Shutter Works equally well whether fitted to the lens hood or the lens body.

TESTIMONIALS.

"The Snap Shot Shutter is a little 'gem.'"—W. E. P.
"I am very pleased with it, and believe it capable of doing all that it has been designed to do."—
"I have an 1/10in. Snap Shot Shutter, with which I am very well pleased."—A. K. W. V. W.
"The Snap Shot Shutter works perfectly."—A. T.
"I have a Snap Shot Shutter and am very pleased with it."—I. M. R.
"The Shutter works well, without perceptible vibration."—U. F.
"To all the people I have shown your Shutter they say it is a marvel. It is truly the simplest, lightest, and cheapest of all the Shutters I have seen and tried, and that is a goodly number."—Miss R.
"I am very much pleased with the Snap Shot Shutter. I have shown the Shutter to several of my friends, and they think it is so very simple and effective, and not liable to go off accidentally, that they all think of purchasing one similar to mine."—F. C.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

Special Shutter.

For High Speed Instantaneous Work.



Particulars of the smallest size:

Price 23/6.

SPEED up to $\frac{1}{150}$ of a second.

DIMENSIONS, $5 \times 3 \times 1\frac{1}{2}$ inches.

WEIGHT, $6\frac{3}{4}$ ozs.

Price List page 46.

Speed Indicator, 3/6 extra.

FOR those who require a quicker Shutter than the ordinary Time and Inst. pattern, for special work, we recommend the Focal Plane Shutter, as described on page 14, and which fits at the back of the Camera. But in cases where the Focal Plane Shutter cannot be adapted, and a very rapid Shutter to fit on the lens is preferred, this "Special" Shutter is the next best for speed. It has a double blind having two openings, which pass across the lens in opposite directions at the same time; the Shutter therefore opens from and closes to the centre.

Although it cannot be made to give such short exposures as our Focal Plane Shutter, it is fast enough for many subjects that require a very rapid Shutter, and possesses the great advantage of being small in bulk. It is fitted in front of the lens, and has a great range of speed.

It is specially suitable for yachting pictures, also for animals in motion, running and jumping, &c.

It is used by all the best and noted yacht photographers.

The Shutter is wound up by turning a knob. An extra strong driving-spring is used, and the various parts are made specially strong to withstand the extra strain.

The other details of its general construction and working will be readily understood by reference to the description of the Time and Instantaneous Shutter (Standard Pattern), the main point of difference being that this Shutter works at twice the speed, and is not adapted for prolonged Time Exposures.

The Speed Indicator is strongly recommended. It shows the speed of the Shutter at a glance.

No vibration with the Special Shutter.

WHEN ORDERING

Please send a narrow strip of paper just long enough to meet round the Lens Hood or Tube.

NOTE.—*This Shutter is recommended to be used on the Lens Tube in preference to the Hood, so that a smaller Shutter may be used and therefore be more rapid.*

TESTIMONIAL.

WE have fully tested the Special Shutter upon the Chronograph, and find the claim of the Company for very high speed is fully justified; the image which it cast at all speeds being sharp and clear, thus denoting full illumination. We congratulate the Company upon the undoubted success they have obtained in the construction of this Shutter.—HENRY STURMEY, Esq., Editor of *Photography*.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

Focal Plane Shutter,

WITH PATENT ADJUSTABLE SLIT.

Fits at the back of the Camera

Particulars of the smallest size:

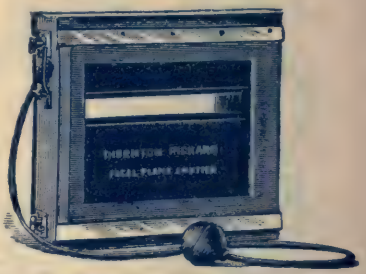
Price 35/-

SPEED (all sizes), $\frac{1}{20}$ up to $\frac{1}{1000}$ of a second.

DIMENSIONS, 5⅛ x 6¼ x 1¼ inches (not including Adaptors).

WEIGHT, 10 ozs.

Price List and Instructions for Ordering, page 47.



Speed Indicator, 3/6 extra.

(Always supplied with this Shutter, unless otherwise ordered.)

FOR those who desire to obtain instantaneous Photographs of subjects having an extremely rapid movement, such as flying birds, animals, and men leaping, jumping, &c., &c., this is the best Shutter. It gives a short exposure and passes a larger percentage of light than any other form.

The "Focal Plane" Shutter is made upon the roller-blind principle, like all the Thornton-Pickard Shutters. It fits at the back of the Camera, and the dark slide fits into the back of the Shutter. The Shutter Blind, therefore, works just in front of the plate, and has a narrow slit in it the full width of the plate, which gives the exposure as it passes rapidly across. The speed is regulated by means of a small knob that winds up the driving spring, and also by altering the width of the Adjustable Slit. The Speed Indicator is always fitted to this Shutter unless otherwise ordered.

The Winding Indicator is an arrangement which automatically prevents the blind being wound up too far when setting the Shutter, and will be found on the opposite side of Shutter from the winding knob. When it is required to focus, wind the blind up as far as it will go, then press the spring lever over the Winding Indicator with the finger of the other hand, and continue the winding.

For prolonged exposures the Shutter is wound up to the top as when focussing, and a cap or a Time Shutter may be used in the ordinary way without removing the Focal Plane Shutter from the Camera.

THE PATENT ADJUSTABLE SLIT

IS fitted to all Focal Plane Shutters, in addition to the adjustable spring roller, without extra charge. This improvement adds greatly to the range of speed of the Shutter, extending from 1-20th of a second to 1-1000th of a second, in all

[*Continued on following page.*

Patent Focal Plane Shutter—(*continued*).

sizes of Shutters, and allowing not only for the fastest instantaneous work possible, but also for all ordinary instantaneous work down to the slowest. This simple and ingenious invention is the only practical and perfect method which has yet been devised for varying the width of the slit in a Focal Plane Shutter. It is done by means of a chain at each end of the slit, which can be lengthened and shortened at will, making the sides of the slit perfectly parallel without any skill in manipulation.

DIRECTIONS FOR ALTERING THE WIDTH OF SLIT.

AFTER removing the focussing screen take hold of the two struts which form the parallel sides of the slit in the blind, and turn them askew, at the same time drawing them forward out of the Shutter. The chains at the ends of the slit can then be manipulated. It will be observed that one end of the chain is fixed permanently to one strut, while the other part of the chain is linked on to the extreme end of the other strut, the end of it passing inwards along the length of the strut. This part may be pulled out and linked on to the end of the strut to make the slit wider, or allowed to spring back into the strut which makes the slit narrower. All that is necessary is to see that the same number of links are used at each end of the slit.

THE SPEED OF THE SHUTTER

IS found by MULTIPLYING THE FRACTION GIVEN ON THE INDICATOR BY THE NUMBER OF LINKS IN USE at each end. That is to say, with only one whole link the speed is that given on the Indicator; with two whole links the speed is half; with three whole links one third; with five whole links one fifth; and with ten whole links one tenth; and so on all through the ten links.

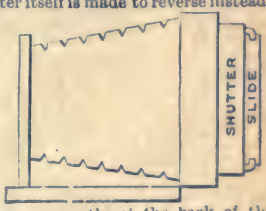
NOTE.—Unless ordered otherwise, a Speed Indicator is fitted to all Focal Plane Shutters.

Hints on the development of very short exposures will be found on page 51.

FITTING THE SHUTTER TO THE CAMERA.

(No extra charge is made for fitting if the Reversible Back with Focussing Screen and a Dark Slide are sent us when ordering.)

THIS Shutter can be readily fitted to almost every kind of Camera, including those of the American type in which the focussing screen is fast to the Camera. We make the shutter to fit at the back of the Camera in place of the reversible back, which is therefore not required, as the Shutter itself is made to reverse instead. It does not alter the Camera in any way, and the reversible back can be substituted in a moment, whenever desired. The shutter is made with a wooden flange which may be cut down to the required size. Similar pins or catches should be fitted on the Shutter to those that are used on the reversible back. The focussing screen sent out with the Shutter should be made to register with the slides.



In a few Cameras (such for instance those having no reversible back) we make the Shutter to occupy the same grooves in the Camera that the dark slide fits; or if preferred, fix the Shutter permanently at the back of the Camera. In either method the back of the Shutter is made to receive the dark slide.

NOTE.—When the Focal Plane Shutter has been fitted to a Camera it does not interfere with other Shutters working on the lens, nor with the use of lens cap for Time exposures.

[*Focal Plane Shutter continued on next page.*

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

Patent Focal Plane Shutter—(*continued*).

SOME ADVANTAGES OF THE FOCAL PLANE SHUTTER.

FOR High Speed Instantaneous work the advantages of the Focal Plane Shutter have not been thoroughly appreciated. It is capable of giving results that cannot be obtained by any other form of Shutter. For the information of those who may not have studied the matter, we beg to draw attention to the following facts.

In the first place it should be remembered that the speed at which a Shutter ought to be worked is limited by the rate of movement of the object photographed, and its distance from the Camera. This is the *primary factor* in all instantaneous work.

The second important factor is the quality of the light, and the intensity or rapidity of the lens. We are assuming that the speed of the plate is the most rapid obtainable. A fast plate is an *absolute necessity* for extremely short exposures.

To obtain the best results with an exposure of say 1-200th of a second, a lens having a large focal aperture must be used, or the plate will be very much under-exposed.

A lens working at *f* 6·5 will pass twice as much light as *f* 8, and will, therefore, take a photograph with a proportionately shorter exposure.

The short exposures obtainable with the Focal Plane Shutter are due to the fact that only a part of the plate is exposed at once. The Shutter consists of a roller blind working in front of and close to the plate. The blind has a narrow slit in it which travels rapidly across the plate. The whole exposure is made, say, for the quarter-plate size (4¼in. by 3¼in.) in 1-50th part of a second; but assuming that the slit is only 1-10th the width of the plate, each particular portion of the plate will receive only 1-10th of that exposure, viz., 1-500th of a second.

Exception might be taken on the ground that in a subject such as an athlete running, or a man diving into water, the portion of the figure exposed last would be slightly in advance of the portion exposed first. This is, in fact, theoretically true, but the whole duration of the exposure from first to last being so very rapid this slight distortion is practically nothing, and is quite invisible to the eye. This may be proved by reference to the photographs reproduced in this Catalogue.

We may mention one minor advantage of the Focal Plane Shutter, viz., that it protects the plate from rays reflected from the inside of the bellows during exposure; none can pass except through the narrow slit, owing to the opaque portion of the blind being close in front of the plate.

TESTIMONIALS.

"We have been using your Focal Plane Shutters for two years now, without anything getting out of order, and with very good results even in poor weather."—H. Bros.

"I took a very fine picture of 'feeding gulls' some time ago with your Focal Plane, 1-800th of a second. I am sure it is a good sample of what the perfect Shutter can do."—D. W.

"The best results I ever obtained are due to these Shutters."—F. K.

"I am satisfied with one of your Focal Plane Shutters which I bought of you in 1893."—J. A. de S.

"We have had your Focal Plane Shutter in use some two years now, and cannot say too much of its value."—L. B.

"I am extremely pleased with the Focal Plane Shutter, which I have tried under very adverse circumstances, and I must say it is infinitely the best kind of Shutter I have ever handled."—T. C. P.

"I am very pleased with the Focal Plane Shutter. The principle upon which it works is, I am sure, the best one yet invented for a Shutter of such high speed."—E. H.

"The Adjustable Slit is a wonderfully ingenious arrangement, and adds much to the utility of the Shutter."—R. B. L.

"I am very much pleased with the Shutter, and I think the Slit is a splendid thing."—R. W. F.

"The Prints before us are marvellous specimens of clearness and sharpness, and quite sufficient proof of the makers' statement as to speed, &c."—*Hand Camera and Lantern Review.*

"It works splendidly. I am very much pleased with it."—M. E.

"With the Focal Plane Shutter I got a result which I never got before in the matter of rapidity and exposure combined."—A. P.

"I am much pleased with its workmanship and smoothness of action."—C. W. W.

"The Shutter gives the most complete satisfaction, being perfectly reliable and covering such a large range of exposures. I cannot speak too highly of it."—B. T. N.

Studio Shutter.

WORKS IN FRONT OF THE LENS OR INSIDE THE CAMERA.

Particulars of the smallest size:

Price 20/6

EXPOSURE, from $\frac{1}{8}$ of a second.
DIMENSIONS, $3\frac{1}{8}$ x $4\frac{3}{8}$ x $\frac{7}{8}$ inches.
WEIGHT, $3\frac{1}{4}$ ozs.
Price List, page 46.



NO VIBRATION.

THIS Shutter is specially suitable for taking children, animals, and all other subjects where silence in the working of the Shutter is a desideratum.

It is made on the blind principle, and is constructed with two separate blinds which wind upon rollers at opposite ends of the box.

In their normal position the blinds cover the aperture and overlap each other. On squeezing the pneumatic ball to make an exposure, each blind instantly winds on to its roller, causing the Shutter to open from the centre as shown partly accomplished in the illustration. On releasing the ball the blinds immediately close. In this manner any exposures may be given from 1-8th of a second to any longer period desired.

The length of exposure is under the perfect control of the operator, so that in case the subject shows any sign of movement the Shutter can be instantly closed.

It is fitted in front of the lens, or inside the Camera.

When placed in front, on the hood or tube of the lens, it is fitted with our Patent Rubber Moulding in the usual manner, and will work in any position, either as shown in the illustration, or upside down, or sideways.

When fitted inside the Camera it is screwed to the back of the frontboard, or fitted on to the back of the lens, and a hole is made in the front or side of Camera, into which the little brass socket fits, which is supplied with each Shutter that is required for inside the Camera. This, then, makes a light-tight joint.

The Shutter is set open for focussing by first squeezing the ball and then turning the tap which is near the ball on the tube.

Extra Balls and Tubes 2s. each for this Shutter. For extra Tubing and Teats, see next page.

TESTIMONIALS.

"The large Studio Shutter you made for me about a year ago works without a hitch. In use every day."—W. D., Sheffield.

"The Studio Shutter I consider a great success."—H. S., Uxbridge.

"I have one of your Silent Studio Shutters. I may say I am well pleased with the working of it."—R. B. N., Cullen.

"May I congratulate you on your Silent Studio Shutter."—F. D. T., Chicago.

"I am delighted with the Studio Shutter; it is just what I wanted."—O. S.

THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

PATENT

Pneumatic Balls and Tubes.

PRICE FROM 1/6 *(see below).*



EVERY Thornton-Pickard Shutter (except the Hand Camera Shutter) is sent out fitted with a Pneumatic Ball and Tube, unless specially ordered without it. This consists of an India-rubber Ball, Tube, and Teat joined together perfectly air tight.

The rubber of which these goods are made is absolutely the best pure rubber that can be obtained for the purpose, and although no rubber goods will last indefinitely, these Balls and Tubes will last a long time with ordinary care.

The Balls and Tubes supplied by us are all specially made for our Shutters. They are much better than anything obtainable from other sources. We would caution purchasers to see that they obtain only those of our make, as there are others of very inferior quality on the market, which only result in disappointment to the user. All of our make are now marked with the words THORNTON PICKARD which is moulded on the ball, as shown above.

The ball is joined to the tube by an air tight screw connection, so that should the ball ever become deflated it can be unscrewed; the ball will then instantly re-fill with air, and after screwing up tight again is ready for use. The end of the rubber tube overlaps the metal connection so as to be squeezed between the two parts of the connection when screwed up, therefore making its own air tight joint, as shown in the above illustration.

Care of the Balls and Tubes.—The best way to preserve these in good condition is to keep them in a place that is not exposed to extreme changes of temperature (such as a cupboard or drawer for instance). The more even the temperature the better. They should not be kept in the sun nor in a brilliant light, as the rubber is then liable to oxidise.

PRICES.

Ordinary Pattern, as supplied with every Thornton-Pickard Shutter except the Studio and Hand Camera Patterns, consisting of No. 0 Small Ball, 2 feet of Tubing, and Teat joined up air tight, **1/6** each, or post free, 1/7.

For Studio Shutter, No. 1 Ball, with 2 feet tubing, **2/-** each.

Large Size, to enable the photographer to release the Shutter when he is some distance from the Camera, for Self-Portraiture with Groups, &c., and for Studio use. Consists of a large Ball, with Tubing of any required length, and Teat, joined up with air tight connection.

No. 3 Ball, suitable for Tubing up to 30 feet long. 2/-
No. 4 do. do. do. over 30 feet long, 4/-

Tubing, **4d.** *per foot. When ordering, please state length of Tubing required.*

Extra Teats, Ordinary Pattern, 3d. each; Studio Pattern, 1/- each. Screw Connections, 3d. per pair (these can be used for joining two short lengths of Tubing together).

NOTE.—When ordered we supply the Long Tubing with a screw connection, so that it may be attached to the short length already on the Shutter by simply unscrewing the small Ball. Thus, either the long or short lengths are readily interchangeable.

TESTIMONIALS.

"I have had one of your Shutters three years, and the Ball and Tube is yet in good condition."—J. E. W., Darwen.

"It is but fair that I should compliment you on the lasting quality of the Rubber you supply."—J. R. M., Melbourne.

"Kindly send me a Ball, as the one I have collapsed entirely to-day after being in hard wear every day for 2½ years, which is about three times as long as any other I ever used."—J. R.

"I have had the Tubing in use over four years so cannot complain."—D. B.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

ALL OUR GOODS BEAR OUR NAME.

Rubber Moulding and Adaptors,

For FITTING SHUTTERS to LENSES, and for ADAPTING ONE SHUTTER to TWO or MORE LENSES.

MADE IN SEVEN DIFFERENT THICKNESSES, AS SHOWN.

Price 8d. per foot.



№	1	2	3	4	5	6	7
	1/16"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4" thick

FITTING.—It should be cut to the required length with a sharp knife, and sprung into the aperture with the rib or flange on the inside, as shown in the engraving.

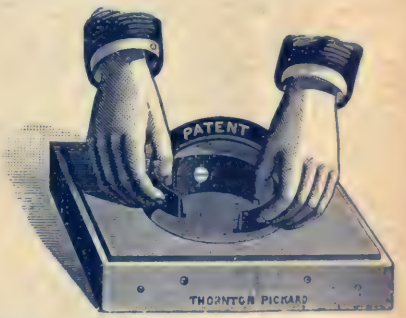
ADJUSTMENT.—The screw in the side of Shutter will give the exact adjustment by turning with a screw-driver. An accurate fit upon the lens hood is thus insured.

Any thickness may be rubbed down on the back with a piece of sandpaper when too thick, or in case of emergency a piece of cardboard may be used as packing behind the Moulding when it is not thick enough.

ADAPTORS.

When it is desired to fit two or more lenses to the same Shutter a second piece of Moulding may be used inside the first one, so as to form an adaptor which can be put in or taken out as required.

Price 8d. each.



In case a very large Shutter has to be adapted to a very small lens, a Wooden Adaptor is necessary; price 1/6 up to 2½in. diameter, and 2/- if larger.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

Speed Indicator,

For the THORNTON-PICKARD Shutters.

PRICE 3/6.



VERY SIMPLE AND RELIABLE. SHOWS AT A GLANCE AT WHAT SPEED THE SHUTTER IS SET. PREVENTS OVER-WINDING OR RUNNING DOWN TOO FAR.

WE strongly recommend customers to order their Shutters fitted with the Speed Indicator. It consists of a dial and pointer, as shown in the illustration. It is fixed to the side of the Shutter. The speeds are shown on the dial in fractions of a second, and the pointer is set to the desired speed by turning the Speed Knob that winds up the driving spring of the Shutter, and the speed is reduced or the pointer set back upon pressing a spring catch that holds the Speed Knob. Very careful tests have been made for each size of Shutter in order to obtain reliable marking of the Indicator Dials.

The Indicator is fitted to any of the Shutters in this Catalogue (except the Studio Shutter, which does not require it), price **3/6** extra. No Shutter ought to be without it. When ordering please state if it is required.

Shutters that have been previously purchased without the Speed Indicator can be afterwards fitted with it for **5/-** They must be sent to us for fitting.

Shutters ordered without the Speed Indicator are fitted with a small ivory label, marked with three speeds, viz., the lowest, medium, and highest, as shown in the Table of Speeds below. By counting the number of turns given to the Speed Knob the speed may be ascertained from this label, and any intermediate speed can, of course, be obtained.

To set the Shutter for the lowest speed the Speed Knob should be wound up only just sufficient to cause the blind to run down gently and to close properly. This is counted as "0" turns, and additional turns of the knob must be counted from this.

Table of Speeds OF THE THORNTON-PICKARD SHUTTERS.

THESE approximate Speeds have been arrived at after a series of very careful tests with apparatus constructed specially for the purpose. The method used gives undeniably accurate results. This Table applies to Shutters that are not fitted with a Speed Indicator.

Speeds of the **TIME AND INSTANTANEOUS** Shutter (Standard Pattern).
Also of STEREOSCOPIC and SNAP SHOT Shutters.

Size of Shutter up to	1½in.			2in.			2½in.			3in.			3½in.			4in.		
No. of turns of Speed Knob.....	0	5	15	0	5	15	0	5	15	0	5	15	0	5	15	0	5	15
Speed in fractions of a Second	1/15	1/45	1/90	1/15	1/40	1/80	1/12	1/35	1/70	1/10	1/30	1/60	1/10	1/25	1/50	1/8	1/20	1/40

Speeds of the **SPECIAL** Shutter.

Size of Shutter up to	1½in.			2in.			2½in.			3in.			3½in.			4in.		
No. of turns of Speed Knob.....	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
Speed in fractions of a Second.	1/30	1/90	1/150	1/30	1/80	1/150	1/25	1/70	1/130	1/30	1/60	1/120	1/25	1/50	1/100	1/15	1/40	1/80

The **FOCAL PLANE** Shutter has a range of speed from 1/10 to 1/1000 of a second, all sizes.

The **SILENT STUDIO** Shutter can be worked from about 1/8 of a second up to any longer period desired.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.



A Good Story.

Exposure $\frac{1}{5}$ sec. Taken by Mr. J. E. Thornton, with a

THORNTON-PICKARD CAMERA AND TIME AND INSTANTANEOUS SHUTTER.







SHUTTLECOCK AND BATTLEDORE.

Exposure $\frac{1}{100}$ *sec. Taken by Mr. J. E. Thornton, with a*

THORNTON-PICKARD CAMERA AND FOCAL PLANE SHUTTER.

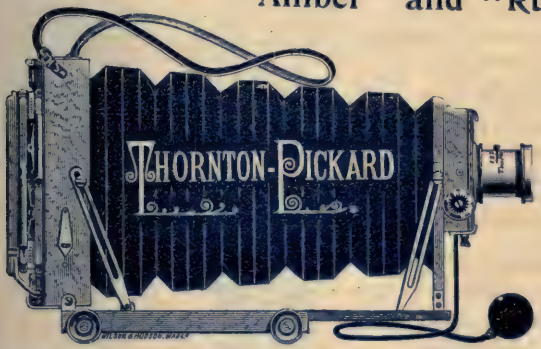
COPYRIGHT

THORNTON-PICKARD PATENT

Cameras.

For Hand or Stand.

"Amber" and "Ruby."



AWKWARD Cameras, which served their requirements a few years ago, are no longer adequate for the amateur and professional photographer of the present day.

The Thornton-Pickard Cameras have been designed and brought to their present form in the first place to suit our own personal wants, which we have realised while taking pictures such as are illustrated in this catalogue. We have therefore introduced the "Amber" and "Ruby" Cameras, which may be used either as first-class Tripod Cameras or as Hand Cameras. This advantage is made possible by their special construction. The Shutter is attached to and forms part of the Camera.

The front and back when erected lock themselves in position at right angles to the baseboard. This, and the arrangement of the spring focussing screen, and also the method of holding the Dark Slide or Plate Holder in the back, is entirely novel, and certainly superior to anything of the kind introduced before.

As to construction, quality is our leading feature; all the goods manufactured by us are of the highest possible quality.

They are scientifically made by the aid of the finest and latest labour-saving machinery, and are mathematically constructed by the most expert workmen. When quality is taken into consideration they are the cheapest in the market.

TESTIMONIALS.

"The Camera is most satisfactory. I would not exchange it for any other in the market."—Rev. B. T. T., Eastbury Vicarage.

"I consider that it fulfils in a marked degree all the requirements of a perfect Tripod Camera, and one that can be used equally well for hand work."—D. G., New York, U.S.A.

"It is a beautifully finished instrument, even to the smallest details."—D. G., Cairo.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

THE THORNTON-PICKARD PATENT

"Amber" Camera

FOR HAND OR STAND.

- Includes all Necessary Movements.
- Swing Back and Swing Front.
- Long and Short Extension.
- Folding Front and Double Pinion.
- Independent Rise to the Front.
- Reversible Back.
- Spring Focussing Screen.
- Self-Locking Stretchers.
- Plumb Indicator.



THE CAMERA COMPETES WITH THE MOST EXPENSIVE IN QUALITY AND THE CHEAPEST IN PRICE.



THE "Amber" Camera is constructed on the same lines as the "Ruby" (a full description of which is given in the following pages).

The "Amber," however, is somewhat simpler, and is not suitable for Stereoscopic Photography.

[*Continued on next page.*

THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

Patent "Amber" Camera—(*continued*).

WHEN opening the "Amber" Camera, the notches in the stretchers or struts lock the front and back at right angles to the baseboard; but vertical swing is obtained at will by lifting the stretchers slightly before moving the back.

The folding front makes the closing of the Camera a very simple matter; the two springs inside the fork must be pressed downwards at each end, the stretchers disengaged from the screws by slight upward pressure with the fingers under the stretchers; the front will then fold down into the baseboard without detaching.

The back is folded by pressure under the stretchers in a similar way.



For Hand Camera work it is advisable, but not necessary, to have a Turntable. The Shutter and Lens will then fold through the baseboard without detaching. When the Camera is supplied without Turntable, the patent folding tripod screw is fitted to the top without any extra charge. The Turntable fitted to this Camera is the same as that supplied with the "Ruby" (see page 27).

The Spring Focussing Screen has been designed specially to meet the demand for a Camera which will work equally well as a Hand Camera. (See engraving on previous page.) It guides the Plate Holders and Slides into position.

The Focussing Screen is fitted at the bottom with a spring hinge, which always holds it in its place. The Plate Holder is slipped in from the top between the screen and the Camera. The Plate Holder simply snaps into position, without any pushing sideways, and is as easily removed by lifting up the spring bar which holds it. This is unquestionably the most convenient method of securing the Plate Holders to the back of the Camera, and adapts itself perfectly for use in the hand.

When a Lens is supplied with the Camera, an ivory Focussing Scale is attached to the baseboard without extra charge. When customer's own Lens is fitted to the Camera, a small extra charge is made for engraving the Focussing Scale to suit the Lens.

A small Finder is advised when the Camera is used in the hand. We recommend a "Bright Finder"—see Price List, page 44. This is fitted on the top of the Camera, and may be used for both horizontal or vertical pictures.

A shoulder strap is provided, which supports the weight of the Camera, and at the same time leaves the hands more at liberty. An adjusting buckle is provided, so that the length may be altered to suit the user.

When a Roll Holder or Plate Magazine is used with the Camera instead of Plate Holders, and it is desired to make successive exposures without inserting the Covering Shutter of the Roll Holder or Magazine, we recommend that a Self-Capping Blind be fitted to the Exposing Shutter (see page 11).



TESTIMONIALS.

We have no hesitation in saying that with such an instrument as the "Amber," photography in winter is nearly as pleasant as during the warmer months. It is the best Camera we have ever had the pleasure of working with. The explorer, the traveller, the artist, or the snapshooter will find it to fulfil their respective needs.—*Practical Photographer.*

The Camera, in spite of its cheapness, is beautifully made and finished, and folds and unfolds, racks in and out, and generally comports itself with all the precision of the most delicately constructed scientific instrument.—*British Journal of Photography.*

The workmanship of this Camera is first class; and after a thorough trial we can confidently recommend it as a thoroughly practical instrument for all classes of work.—*Photo News.*

The "Amber" Camera is thoroughly well planned in every particular, and the workmanship, materials, and finish are of the best.—*Photo Dealer.*

We consider the "Amber" Camera wonderfully good value for the money.—R. & Co.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

PATENT

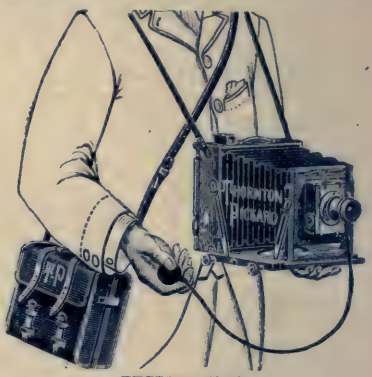
UP TO DATE.

"Ruby" Camera

FOR HAND OR STAND.



It is a Stand Camera, but may also be used as a Hand Camera.
The Shutter is attached to and forms part of the Camera.
The Shutter folds up into the baseboard.
The front has an unlimited amount of Rise and Fall.
The Camera is fitted with Vertical and Horizontal Swings.
The Back may be pushed right up to the front for use with Wide Angle Lenses.
The Camera has a Double Pinion, so that it may be racked from the longest to the shortest focus.
May be arranged for Stereoscopic Work.
The Workmanship is perfection and unsurpassed in any other Camera.



TESTIMONIAL.

"The Princess wishes to express her appreciation of the 'Ruby' Camera, which has such beautiful finish, ingenious contrivances, and perfect workmanship. It is a splendid instrument."—PRINCESS O.S.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

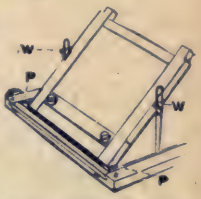
ALL OUR GOODS BEAR OUR NAME.

PATENT "RUBY" CAMERA—(*continued*).

Perfect as a Tripod Camera.

Perfect as a Hand Camera.

Perfect as a Stereoscopic Camera.



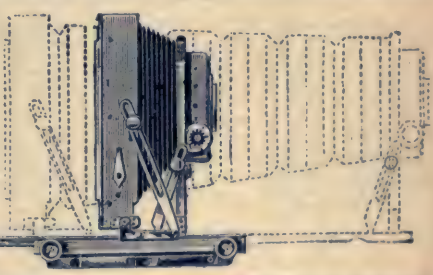
The Shutter is the Thornton-Pickard Time and Instantaneous Behind Lens Pattern. It is attached to the Camera front, works behind the lens, and is always in position ready for use. It is fitted with a detachable panel, to which the lens flange is attached. The lens being mounted on the Shutter may remain attached, and fold up with the Camera. When a Roller Slide or Magazine is used it is advisable to have the Shutter fitted with a Self-capping Blind. For *extremely* rapid Instantaneous work we recommend the Focal Plane Shutter in *addition* to the Time and Inst. one. One Shutter does not in any way interfere with the other.

The Turntable forms part of the Camera. This arrangement is infinitely superior to the old-fashioned loose triangle, as there is no chance of leaving it behind, and so rendering the Camera useless when away from home. The Thornton-Pickard form of Turntable is superior to the ordinary design, as it allows the legs to be spread to any extent when erecting the Camera in awkward situations. Its large size insures a very rigid base for the Camera. The Camera may be revolved upon the Turntable in either direction, and is clamped firmly in position by a winged nut, which will be found on the right-hand side of the Camera baseboard, in a most convenient position.

The Folding Front of the Camera is very simple. It can be quickly erected, and is rigid and firm when in position. The engraving shows how to fix it. After opening the Camera place the Front in the position shown, leaning backwards so that the segment plates at the bottom of the Front are over the pivots marked P. Press the front down between the pivots, and then place it in the vertical position, as shown in the other illustrations.

Patent Spring Stretchers. The Front will at once lock itself by means of the Patent Spring Stretchers at right angles to the baseboard. When used as a Hand Camera the Front is always in this position, that is, at right angles to the baseboard. When required to be swung or inclined to any other position it is clamped by the thumbscrew W. All clamping screws have flat or winged heads, which are much more convenient to use than the old form of round milled head.

Wide Front. The Front is much wider than usual in Cameras having tapering bellows. Owing to the special design and arrangement of the Camera, we are able to obtain a wider front and wider bellows than in any other Camera having taper bellows, without sacrificing compactness when folded. The wide Front and bellows are a great advantage, as there is no danger of cutting off part of the picture when using wide angle lenses, and the same Camera can be used for Stereoscopic pictures. This is the only Camera of its kind which can be used for Stereoscopic work in the half-plate size. Our own pattern Stereoscopic Lenses are specially mounted for use with this Camera.



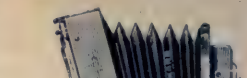
Double Pinion for focussing. The Camera is fitted with two focussing pinions, which enable it to be racked from the shortest to the longest focus without any unscrewing or shifting of the frontboard, and without removing the head from beneath the focussing cloth.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

PATENT "RUBY" CAMERA—(*continued*).



Wide Angle Lenses may be used with this Camera without danger of the Baseboard cutting off part of the picture. This is done by pushing the back of the Camera nearer to the front, and then clamping it in position by the screw at the side. It is necessary to first depress the two springs on the back of the Baseboard which hold the cross rod. The brass racks attached to the Extension Frame are marked on each side to indicate when the Camera body is parallel with the front. If desired, the front may be racked backwards instead, by means of the back pinion.

Rising and Falling Front. The range obtainable is perhaps greater in the "Ruby" Camera than in any other. It works independently of the other movements, and can, therefore, be altered after focussing if desired. The Frontboard works in grooves in the fork, and is fixed at any height by two clamping screws at the bottom. When the top of the frontboard is level with the top of the fork, the lens is opposite the centre of the plate.

AS a rule it is best to have the lens a little above the centre of the plate; otherwise where there are buildings in the picture, there will be too much foreground.

A CORRESPONDING amount of fall may be obtained, so as to bring the lens below the centre of the plate, which is useful and necessary when taking photographs from a window or elevated situation.

Spring Stretchers. Both the folding front and the back of the Camera are fitted with our patent Spring Stretchers, so that they automatically lock themselves at right angles to the Baseboard. This is of great importance for Hand Camera work, as otherwise the focussing could not be depended on. Unless the front and back are intentionally placed at an angle, they will lock themselves into position at right angles to the baseboard, and the focus is indicated by the Focussing Scale attached to the baseboard. The Camera may then be used in the hand or on the tripod without focussing on the ground glass, the picture being viewed in miniature on the finder.

All Swinging Movements. These are complete, every necessary movement being obtainable.

VERTICAL SWING.—The back may be swung backwards or forwards, and clamped by the set screw at each side as shown above. The front may be swung and clamped in a similar manner.

HORIZONTAL OR SIDE SWING is obtained by depressing the two springs at the back of the Baseboard and then loosening the clamping screw that secures the back at any position on the Baseboard. One side may then be placed nearer to the lens than the other, after which the screw should be tightened up again. This movement is to obtain objects in sharp focus that are nearer to the Camera at one side than the other.

Plumb Indicator. This is fitted to the side of the Camera body. For subjects having straight vertical lines, such as buildings, &c., whatever the position of the Camera, the back *must hang plumb*. If it does not, the vertical lines will converge instead of being parallel. By swinging the back until the point of the Plumb Indicator coincides with the pin or stud on the side of the Camera, and then tightening the setscrews, the back will be made upright.

1,000 FRANCS WON WITH A RUBY CAMERA.

"You may perhaps be pleased to hear that the First Prize of Fr.1,000, offered by the European Edition of the *New York Herald*, was won by me in the International Competition for Amateur Photographers recently held in Paris. The winning Photograph was taken by me with the beautiful Thornton-Pickard Half-Plate 'Ruby' Camera which you sent to me in Egypt last winter. The Camera has now been in use nearly a year, under very many trying atmospheric conditions, and it has never failed to give entire satisfaction."—D. G.

"I have not met with anything to surpass the 'Ruby' in beauty or excellent work, and three of my friends have each purchased one through seeing it and its results."—E. J. C.

"The workmanship is beautiful, nothing better can be desired."—BISHOP of G.

"I like the Camera very much. I am particularly pleased with the easy way in which the Plate-holders can be slipped in for use."—H. G. D.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

PATENT "RUBY" CAMERA—(*continued*).

The Reversible Back or frame to which the Focussing Screen is attached, and into which the Dark Slides fit, can be placed either way up for horizontal or vertical pictures. So that if the Shutter of the Slide cannot be drawn out, owing to the Camera being close to a wall, say, as is often the case when taking interiors, the Back can be turned upside down, so that the Shutter of the Slide can be drawn out at the opposite side of the Camera. The Plate Holder or Dark Slide is placed in position between the Spring Focussing Screen and the Camera.

The Patent Spring Focussing Screen has been designed specially for using the Camera as a Hand Camera, and is most convenient in practice. It guides the Plate Holder and Slides into position.

Patent Plate Holder. This is simple, light, and efficient. It is not made book form, but solid, the Plates being inserted by drawing the Shutters on either side and pulling back the Spring-Bar at one end of the Holder. The Plate can then be dropped into place, and is held securely by the Spring-Bar. They are fitted with Spring Snaps to prevent the Shutters being accidentally withdrawn, and with our Patent Recorders, which show whether the plates have been exposed or not.

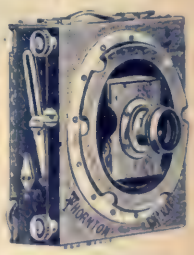
Full particulars under Plate Holders, page 34.



The Plate Holders or Dark Slides are equally suitable for plates or films.

The Dark Slides are of the best finished workmanship, and have hinged folding Shutters, which may be folded back, so as not to catch the wind during exposure. They are fitted with Improved Spring Snaps which securely fasten the Shutters when pushed in. Additional Dark Slides can always be supplied to fit by mentioning size of Camera. The Slides are perfectly light-tight, and are therefore suitable for the most sensitive plate. This is due to the careful workmanship, to the special form of velvet packing placed under the Shutter, and to the Snap being on the OUTSIDE instead of recessed into the Shutter. They are book form, and hold two plates each, which are separated by a hinged division that cannot be misplaced or lost in the dark room. They are fitted with the Patent Dark Slide Recorder shown in the above illustration. This is a great acquisition, as it shows at a glance which plate has been exposed, and prevents mistakes, such as taking two pictures on one plate.

Our Patent Automatic Tripod Stand is supplied with the Camera, and fits the Turntable. It is the simplest and most convenient Stand made. The joints of the Stand rigidly lock themselves when they are opened out. Each leg is made with three sections, the bottom one of which slides, so that the length may be adjusted when required for uneven ground, and is clamped by a set screw. The Stand opens out to a height of 4ft. 7in., and closes up to 22 inches in length for convenience in carrying. This Stand is described in greater detail on page 32.



The Focussing Screen is made of the finest Ground Glass, and is marked with the sizes of smaller plates. This is a convenience when using smaller plates, which is done by means of Carriers that fit inside the Plate Holders or Slides.

When closing the Camera, do not thread the Pneumatic Ball and Tube through the Turntable; this is not necessary. Let it hang down in front of the Camera. A notch is made in the woodwork (close to the Spring Snap that closes the Camera) into which the tube should be placed as the Camera body is folded down. The ball and tube then comes out and rests on the top of the Camera when placed in the bag.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

The "Ruby" Camera

Arranged for

Stereoscopic Work.

BOTH the Half-plate and 7½in. x 5in. sizes are suitable. The Half-plate takes a pair of lenses of 1⅝in. diameter at 3in. centres, and the 7½in. x 5in. size takes larger lenses at wider centres. A DETACHABLE STEREOSCOPIC DIVISION is fitted so that either one lens for full-sized pictures or a pair of Stereoscopic lenses may be used at will,

A Stereoscopic Behind-Lens Time and Inst. Shutter is recommended. This is permanently fixed to the front, and a pair of lenses are mounted on a panel that fits into the front of the Shutter. This panel is removable, and another panel with the lens mounted in the centre can be quickly substituted for taking full-sized pictures. To fold the Camera, the panel carrying the Shutter and Lenses should be removed.

We supply Stereo Lenses, specially mounted to suit the "Ruby" Camera and Stereoscopic Shutter. These are first-class Lenses.



PRICES OF STEREOSCOPIC LENSES, INCLUDING SPECIAL MOUNTING.

See Price List, page 41.

Particulars of the "Ruby" Camera.

	Half-plate.	Whole-plate.
Size when folded, including Turntable, Shutter, and all projections	9in. x 8½in. x 3¾in.	11¼in. x 10½in. x 3¼in.
Longest Focus with Shutter attached	16in.	20in.
Weight	3½lbs.	5lbs.
Do. including Shutter	3¾lbs.	5½lbs.

Aluminium Fittings save about one-quarter of the weight.

TESTIMONIALS.

"The Camera is extremely satisfactory and fully capable of dealing with any subject which could possibly arise. The permanent Shutter is a great acquisition."—V. D.

"We may say that for utility, lightness, and beauty of finish, we consider your "Ruby" Camera unexcelled, and the stand and plate-holders marvels of ingenuity."—J. S. & Son.

"The Camera works well and smoothly in every way, and there is none of the sticking and other drawbacks one so often meets with. Every detail seems to have been well studied and worked out, and though it is a handsome piece of apparatus, the working qualities have in no way been sacrificed to this."—A. J. B. C.

THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

PATENT

Recorder, For DARK SLIDES or PLATE HOLDERS.

Price **SIXPENCE** each. Fitting to Slide, **3d.** extra.

One Recorder is required for each plate—that is, two for a Double Slide or one for a Single Slide.

NOTE.—*The Recorder is fitted to all Dark Slides and Plate Holders of our manufacture without extra charge.*

Shows at a glance which plates have been exposed. Prevents two pictures being taken on one plate.

THIS simple little device has proved a great success. It ought to be fitted to every Dark Slide and Plate Holder. It records automatically which plates have been exposed and which have not.



BEFORE EXPOSURE.

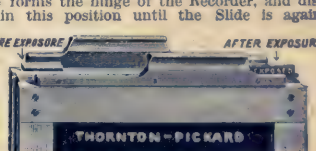


AFTER EXPOSURE

The Recorder is fitted at the top of the Slide (as shown in the illustration), and can therefore be seen without taking the Slides out of the carrying case or bag. It lies down flat before exposure, but flies up and stands upon edge after exposure, so that it can be seen at a glance which plates have been exposed and which have not. At the same time, it does not lock the Shutter of the Slide, and if this has been drawn, and the plate has not been used, the Shutter can be pushed back again and drawn a second time when required.

This simple device prevents the danger of taking two pictures on one plate. It saves a world of trouble, and is an infallible substitute for the memory.

The Recorder consists of a small hinged plate or lid, which lies down flat before exposure. It is fitted in such a position that the handle or projecting part of the Shutter holds it down. As soon as the Shutter of the Slide is withdrawn to expose the plate, the lid flies open by means of a steel spring, which at the same time forms the hinge of the Recorder, and discloses the word "EXPOSED," remaining in this position until the Slide is again charged with a fresh plate in the dark room. The Recorder may then be set ready for the next exposure by simply closing down the lid with the forefinger, at the same time closing the Shutter of the Dark Slide.



The Recorder is easily fitted to Slides, but we prefer to do this where possible. Slides may be sent to us direct or through any dealer. As a rule they can generally be returned fitted the next day. A convenient way to send them is by parcel post.

TESTIMONIALS.

"I can't tell you how valuable I have found your little Dark Slide Recorder to be. Many a time they have saved me from exposing a plate twice over. I would not be without them at any cost."—E. H.

"Your Recorder is an excellent one; most simple and most effective."—W. L.

"I am very pleased with the Dark Slide Recorders, which I have found invaluable when exposing many plates in one day."—M. C.

"The Dark Slide Recorder is a very simple and useful indicator. It does not lock the Shutter after an exposure, but it shows that the slide has been withdrawn."—*Photographic*.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

PATENT

Automatic Stands,

With Patent Self-Locking Joints.

PRICES.		Twofold.	Threefold.
No. 1.	For Quarter-Plate, Half-Plate, and Whole-Plate Cameras	13/-	17/6
	Stand Top for same	2/6	2/6
No. 2.	Extra Strong, for 10 x 8 and 12 x 10	18/-	22/6
	Stand Top for same	2/6	2/6
	Patent Folding Tripod Screw fitted to above to suit Thornton-Pickard Cameras, FREE.		
	Do. do. to fit other makers' Cameras	1/6	1/6



Twofold Stand.

These Stands are supplied with the "Amber" and "Ruby" Cameras, and are also suitable for use with other makers' Cameras.

When the Camera is fitted with a Turntable, the Stand Top and Tripod Screw are not required.

When the Camera is supplied without Turntable, the Patent Folding Tripod Screw is fitted to the top without extra charge.

Both the Twofold and Threefold Stands are easily erected, the joints automatically lock themselves on being opened. They are released by simply pressing the spring bolt with the finger, as shown in the illustration on opposite page.



Threefold Stand.

The particular method by which the arms are attached to the stand top allows of the legs being spread to almost any extent; this applies both when used with a Turntable or with a top.

Continued on next page.

Patent Automatic Stands—(*continued*).

Well-seasoned timber is used in the construction, and the finish and workmanship are the best.

In the Threefold Stand the lower section is adjustable for uneven ground.

Handle straps are provided for convenience in carrying.

Waterproof cases, see page 38.

	Weight.	Height when open.	Length when closed.
No. 1.	2lbs. 5ozs.	..... 4ft. 7ins.	22ins.
No. 2.	3lbs.	..... 4ft. 7ins.	22ins.



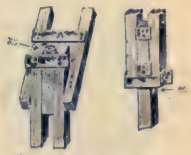
The Stand Top.

This is made of well-seasoned mahogany, French polished, and the top side covered with cloth, so as not to scratch the Camera.

It is of handsome appearance, and has no sharp corners or projections.



STAND CLOSED.



SELF-LOCKING JOINTS.

When the top is fitted with the Patent Folding Tripod Screw there is no loose part to be lost or left behind. This is an ordinary Tripod Screw, but the socket through which it works is pivoted, allowing it to fold flat into the top, as shown in the engraving.



OPEN



FOLDED

This is a most desirable thing for a Camera which is not fitted with a Turntable.



TESTIMONIALS.

"Your Camera Stand is excellent, and I like your workmanship."—F. A. J.

"The Automatic Stand is very convenient and quickly erected, besides being rigid."—H.R.P.

"The Stand is a marvel of ingenuity and compactness."—L. J.

"We think the Stand is the best and neatest we have seen, and is cheap."—T. O. B.

"I obtained from you about a year ago one of your Tripod Stands. I have used it constantly since then, and consider it to be the most convenient Tripod on the market." E. R.

"I am exceedingly well pleased with the Tripod I had from you last year."—W. B.

"I cannot tell you how I am charmed with the Stand, it is perfectly rigid, beautifully light, and packs up into such a small compass."—J. L. C.

"I am greatly pleased with the Camera Stand."—W. H. B.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

Plate Holder, WITH PATENT SPRING BAR.

PRICE from 7/- each.

See page 37 for prices.

For Plates or Films.

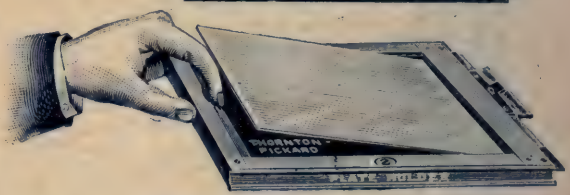
Absolutely light-proof to the most sensitive plates.

Plates changed in half the time, and in the dark.

The Shutters pull right out.



OF BEST WORKMANSHIP AND WELL-FINISHED.



DESCRIPTION.

THE important feature of this Plate Holder is the automatic Spring Bar, which allows of the plate being instantly put in or taken out by simply pressing with the finger.

This Plate Holder carries two plates. It is perfectly light-tight, and safe for the most sensitive plates, and is the most convenient and successful form of Dark Slide yet invented.

It is fitted with an improved form of Spring Snap, which prevents the Shutter from being drawn accidentally, and also with our patent Recorders that show at a glance which plates have been exposed—adding greatly to its efficiency.

The Shutters are printed as shown in the illustrations, so that particulars of the exposure, &c., may be filled in the blank spaces with a lead pencil.

To remove the pencil marks from the Shutter, wet the surface and rub with the fingers, or better still, a piece of india-rubber.

The Plate Holder is suitable for use with SMALLER PLATES by using Plate Carriers, and also for CUT FILMS by using Film Carriers. (*See page* 48.)

The Plate Holder can be supplied to fit almost any Camera without alteration to either the Camera or existing Slides, and fits into the same grooves as the latter.

It is beautifully made of mahogany and French polished.

INSTRUCTIONS FOR USE.

TO INSERT A PLATE IN THE HOLDER pull out one of the Shutters. Then taking hold of the plate in the left hand, push the plate under the rabate at the top end of the Plate Holder, and press back the Spring Bar with the forefinger of the right hand. The plate will now be in the position shown in the illustration, resting upon springs which are not shown. Now with the left hand press the plate down into position, then the Spring Bar is allowed to spring forward and holds the plate firmly.

[*Continued on page 37.*

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.



HOOP JUMPING.

Exposure $\frac{1}{150}$ sec. Taken by Mr. J. E. Thornton, with a

THORNTON-PICKARD CAMERA AND FOCAL PLANE SHUTTER.



HAYTIME.

Exposure $\frac{1}{5}$ sec. Taken by Mr. J. E. Thornton, with a

THORNTON-PICKARD CAMERA & TIME & INST. SHUTTER, USED AS A HAND CAMERA

The Thornton-Pickard Patent Plate Holder—*(Continued).*

To TAKE THE PLATE OUT, it is only necessary to press back the Spring-Bar with the fore-finger, as previously described; the plate is at once lifted up by the spring underneath to the position shown in the same illustration, and is then taken out with the other hand.

There is an opaque division inside the Holder which divides the two plates and carries on each side the two above-mentioned springs. These springs serve the double purpose of keeping the plates close up to correct focus, and lifting them out when required.

TESTIMONIALS.

"I am more than pleased with the Plate Holders; they are simply perfection."—T. M. B.
"I think the Plate Holders exceptionally simple and perfect."—J. C.
"I am very well pleased with your Double Plate Holders; will you send me five more ¼-plate size."
"The Plate Holders work very nicely."—E. E. B.
"They are first class. I am much pleased with them, and my client delighted."—E. M.
"I like the Plate Holder immensely. It is wonderfully clever."—W. S. B.
"I am well satisfied with its finish, and consider it the best of its kind in the market."—P. B.
"The Plate Holders I had from you a short time ago are most satisfactory in every way, and much more convenient to use than the book pattern."—E. W.
"I am very pleased indeed with the Plate Holders, as they are convenient in every way, and I am recommending them to many of my friends."—G. B.

PRICES.

Each Plate Holder takes two plates, or two cut films in Carriers.

Size in inches	4¼ x 3¼	5 x 4	6½ x 4¾	7½ x 5	8½ x 6½	10 x 8
Price each	7/-	8/-	9/-	12/-	15/-	21/-

Intermediate sizes same price as the next size larger. Special and Continental sizes made to order. When ordering please state what numbers are to be put on the Plate Holder. Two ivory numbers are fitted into each Holder.

If required for a Thornton-Pickard Camera it is not necessary to send a slide as a pattern, and in that case no charge is made for fitting. For other Cameras, a slide is required, or better still, the reversing back, and a small charge is made for fitting according to the time taken.

PLUMB INDICATOR.

FOR ATTACHING TO CAMERA.

CANNOT GET LOST. NO SKILL REQUIRED TO FIX.

Price SIXPENCE each.

(Post Free, Sevenpence.)

Including Screws complete for Fixing.

Also supplied to dealers on Show Cards containing one dozen.



WHEN photographing any subject in which there are vertical lines, such as buildings, &c., it is **absolutely necessary** that the sensitive plate should **hang plumb**, or the vertical lines will not be parallel in the resulting photograph. It is difficult to judge when the plate does hang plumb without a **Plumb Indicator.**

It is shown full size in the accompanying illustration.

FITTING TO CAMERA.

DECIDE upon a position on one side of the Camera that does not interfere with the brass plates or stretchers. Place one edge of the black plate carrying the swinging Plumb exactly parallel with the straight edge of the Camera, and fasten with the screws supplied.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 60).

Waterproof Cases.



A.



INSIDE ARRANGEMENT OF A.



INSIDE ARRANGEMENT OF C.



C.



INSIDE ARRANGEMENT OF D.



D.



LUGGAGE CARRIER FOR BICYCLE.



STAND CASE.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

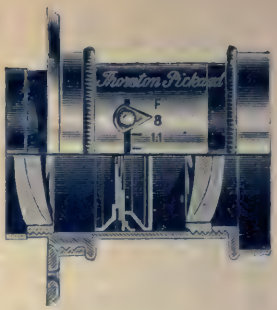
PRICE LIST of THORNTON-PICKARD WATERPROOF CASES.

SIZE	Quarter-plate. 4¼in. x 3¼in.	5in. x 4in.	Half-plate. 6½in. x 4¼in.	7¼in. x 5in.	Whole-plate. 8½in. x 6½in.	10in. x 8in.	12in. x 10in.
For CAMERAS.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Waterproof Cloth Case, Leather Bound, with Collapsible Sides and Loose Division, Lined with Green Baize, and Fitted with Snap Lock and Key and Shoulder Strap.							
A To hold Camera, three Slides, Shutter, Lens, Focussing Cloth, &c.	- 7 6	- 8 6	- 9 6	- 11 6	- 13 6	- 16 0	—
B To hold three extra Slides only	- 5 6	- 6 6	- 7 6	- 8 6	- 9 6	—	—
Strong Waterproof Cloth Case, Leather Bound, with Stiff Sides and Fast Division, Lined with Green Baize, and Fitted with Snap Lock and Key, Handle, and Shoulder Strap, which may also be used Knapsack fashion.							
C To hold Camera, three Slides, Shutter, Lens, Focussing Cloth, &c.	- 14 0	- 15 0	- 16 0	- 18 0	1 0 0	1 3 0	1 8 0
D To hold Camera, six Slides, Shutter, and accessories; or Camera with Lens attached *in situ*, five Slides, Shutter, and accessories; or Stereoscopic Camera, five Slides, Shutter, and accessories	- 17 6	- 19 0	1 0 0	1 2 0	1 4 0	1 8 0	1 15 0
E To hold Camera, Focal Plane Shutter, three Slides, and accessories	1 0 0	1 2 6	1 3 6	1 5 6	1 7 6	1 12 0	2 0 0
Solid Leather Case, of Best Quality and Finish.							
F To hold same as C	1 5 0	1 10 0	1 15 0	1 17 6	2 2 0	2 15 0	3 0 0
G To hold same as D	1 10 0	1 15 0	2 0 0	2 2 6	2 7 0	3 0 0	3 5 0
H To hold same as E	1 12 6	1 17 6	2 2 6	2 5 0	2 9 6	3 2 6	3 7 6
For STANDS.							
Strong Waterproof Cloth Case, Leather Bound, to hold Tripod Stand	- 7 0	- 7 0	- 7 0	- 7 0	- 7 0	- 9 0	- 9 0
FOR LENS. Solid Leather Case, Round	- 3 6	- 3 6	- 4 0	- 4 0	- 4 6	- 5 6	- 7 6

ENTER FOR OUR PRIZE COMPETITION (see page 50).

THORNTON-PICKARD

Lenses.



THESE lenses are of the finest quality that can be obtained at the price quoted, and are constructed specially for use with the Thornton-Pickard Cameras.

Any one of them will be provided with a Certificate of Merit from the Kew Observatory at an extra cost of 10s. each.

Amber Rapid Rectilinear Lens, *f*8, with Iris diaphragm.

This is a good general all-round lens for all kinds of Photography, including instantaneous work. It is free from distortion, and gives perfectly straight lines and fine definition. This lens may also be converted into a long focus lens by using one of the combinations only. This practically gives two lenses of different focus. The single lens is specially useful for landscape work, where a long focus is necessary. With the single lens it is advisable to use a small stop, and give a proportionately longer exposure. The same number on the Iris diaphragm with single lens will require approximately four times as much exposure as the complete lens.

		Quarter-plate.	Half-plate.		Whole-plate.	
To cover plates	inches	4¼ x 3¼ Also 5 x 4	6½ x 4¾	7½ x 5	8½ x 6½	10 x 8
Price		£1 7 6	£1 12	£2 15	£2 15	£4 10
Focus...	inches	5½	9	11	11	13½
Focus when the front combination only is used as a single lens...	inches	10½	16	20	20	

Ruby Rapid Rectilinear Lens, *f*8, with Iris diaphragm.

This is a very fine lens for all-round work. It has a flatter field than the previous lens, and is of the highest finish. It can also be converted into a long focus lens, as above.

		Quarter-plate.	Half-plate.		Whole-plate.		
To cover plates	inches	4¼ x 3¼ Also 5 x 4	6½ x 4¾	7½ x 5	8½ x 6½	10 x 8	12 x 10
Price		£2 10	£3	£4	£4 10	£5 5	£7 10
Focus	inches	5½	9	9½	11	13½	17½
Focus when the front combination only is used as a single lens	inches	10½	16	17	20		

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ALL OUR GOODS BEAR OUR NAME.

Wide Angle Rectilinear, *f* 11, with revolving diaphragm, suitable for confined situations, &c.

		Quarter-plate.	Half-plate.		Whole-plate.		
To cover plates...	inches	4¼ x 3¼ also 5 x 4	6½ x 4¾	7½ x 5	8½ x 6½	10 x 8	12 x 10
Price		£2	£2 10	£4	£4	£5	£6
Focus	inches	4	5½	7	7	9	11

Stereoscopic Lenses, *f* 8, 5½in. focus, with Iris diaphragm.

"Amber" Rapid Rectilinear Lenses, accurately paired, **£3** per pair.

"Ruby" Rapid Rectilinear Lenses, accurately paired, **£5 5** per pair.

These Lenses are constructed specially for use with the Thornton-Pickard Cameras.

The above Lenses are subject to a discount of 5 per cent. for cash with order.

TESTIMONIALS.

"I tried the Lens; it is very good value for the money, and as good as some I have seen at double the price."—J. P.

"I am very pleased with the Lens indeed."—E. H. B.

"I have tested the Lenses and find them both first class."—T. E.

"The Rectilinear Lens has done some excellent portraits, first-class landscape work, and some very interesting instantaneous pictures."—J. J. K.

"Our customer who had the Lens a short time ago is very pleased with it."—C. G. & Son.

"I have used the Lenses and find them first class."—T. E.

"The Lens is excellent, and gives splendidly sharp definition."—H. R. P.

"The Stereoscopic Lenses are excellent, and produce beautiful results. I am greatly pleased with them, and have used them with great satisfaction."—W. J. L.

Cooke Lenses, *f* 6·5, Series III., with Iris diaphragm.

		Quarter-plate.	5 x 4	Half-plate.
To cover plates	inches	4¼ x 3¼		6½ x 4¾
Price		£4 2	£4 12	£5 12
Focus	inches	5	6	7½

Ross-Zeiss Convertible Anastigmat, *f* 6·3, Series VIIa.

Most of the photographs reproduced in this catalogue were taken with this lens.

For rapid instantaneous work it is the best we know of. It works at a large aperture, viz.: *f* 6·3, and covers perfectly to the extreme edge of the plate. If stopped down it covers a plate nearly twice the size.

We prefer to supply these lenses ourselves, and when supplied with a Thornton-Pickard Camera, a focussing scale is engraved on the baseboard without extra charge.

	Quarter-plate.	5 x 4	Half-plate.	7½ x 5	Whole-plate.
To cover plates ... ... inches	4¼ x 3¼		6½ x 4¾		8½ x 6½
With Iris Diaphragm	£7 5	£8 5	£9 15	£11 15	£15 5
Focus of the complete lens ins.	4½	5	6½	8	9½
Focus of either the back or front lens, used singly ... inches	7½	9	11½	14	16½

The prices of Ross Lenses are net.

THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

Complete Outfits.

THE sets of apparatus below have been arranged for the convenience of purchasers who are requiring Complete Outfits, and may be taken as the best selection that can be made in proportion to the cost. At the same time we shall be glad to alter the arrangement of any outfit to suit the requirements of the purchaser.

See price list page 44 for larger sizes.

"AMBER" OUTFITS.	Quarter-plate. 4¼ x 3¼	5 x 4	Half-plate. 6½ x 4¼	7½ x 5	Whole-plate. 8½ x 6½	10 x 8
"AMBER" Outfit No. 1.						
Camera	2 13 6	3 2 6	3 8 6	4 5 0	4 18 6	5 17 6
Double Plate Holder	- 7 0	- 8 0	- 9 0	- 12 0	- 15 0	1 1 0
Stand, Two-fold, including Top	- 15 6	- 15 6	- 15 6	- 15 6	- 15 6	1 0 6
"Amber" Rapid Rectilinear Lens.	1 7 6	1 7 6	1 12 0	2 15 0	2 15 0	4 10 0
	5 3 6	5 13 6	6 5 0	8 7 6	9 4 0	12 9 0
Waterproof Cloth Case, pattern A extra	- 7 6	- 8 6	- 9 6	- 11 6	- 13 6	- 16 0
"AMBER" Outfit No. 2 (for Hand or Stand).						
Camera	2 13 6	3 2 6	3 8 6	4 5 0	4 18 6	5 17 6
Double Plate Holder	- 7 0	- 8 0	- 9 0	- 12 0	- 15 0	1 1 0
Turntable	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 5 0
Stand, Two-fold	- 13 0	- 13 0	- 13 0	- 13 0	- 13 0	- 18 0
Time and Inst. Shutter, with Speed Indicator fitted to front of Camera	1 4 6	1 4 6	1 6 6	1 6 6	1 9 6	1 14 6
"Amber" R. R. Lens	1 7 6	1 7 6	1 12 0	2 15 0	2 15 0	4 10 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	7 14 0	8 4 0	8 17 6	11 0 0	11 19 6	15 14 6
Waterproof Case, pattern A	- 7 6	- 8 6	- 9 6	- 11 6	- 13 6	- 16 0
"AMBER" Outfit No. 3 (most complete for Hand or Stand).						
Camera	2 13 6	3 2 6	3 8 6	4 5 0	4 18 6	5 17 6
Three Double Plate Holders	1 1 0	1 4 0	1 7 0	1 16 0	2 5 0	3 3 0
Turntable	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 5 0
Stand, Three-fold, to fit Turntable.	- 17 6	- 17 6	- 17 6	- 17 6	- 17 6	1 2 6
Time and Inst. Shutter, with Speed Indicator fitted to the front of Camera	1 4 6	1 4 6	1 6 6	1 6 6	1 9 6	1 14 6
"Ruby" R. R. Lens	2 10 0	2 10 0	3 0 0	4 0 0	4 10 0	6 5 0
Wide Angle Lens. See page 41.	2 0 0	2 0 0	2 10 0	4 0 0	4 0 0	5 0 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	11 15 0	12 7 0	13 18 0	17 13 6	19 9 0	24 16 0
Waterproof Case, pattern C	- 14 0	- 15 0	- 16 0	- 18 0	1 0 0	1 3 0
Brassbinding Camera	- 15 0	- 16 6	- 18 0	- 18 0	1 0 0	1 3 0
Brassbinding Plate Holders ..each	- 3 0	- 3 6	- 4 0	- 4 0	- 5 0	- 5 6
Focal Plane Shutter, with Speed Indicator fitted to Camera	1 18 6	2 3 6	2 8 6	2 16 0	3 3 6	3 13 6
Dark Room and Chemical Outfit, including Chemicals, Dishes, Ruby Lamp, &c.	- 15 0	1 0 0	1 5 0	1 10 0	2 0 0	—
Dovetailed Box, partitioned for Camera, Plate Holders, Shutter, Chemicals, Accessories, &c.	- 12 6	- 14 0	- 15 0	- 18 0	- 18 0	1 3 0
Strong Dovetailed Box, fitted with lock and key to contain Complete Outfit, and Chemicals, &c., for travelling or storing	- 17 6	- 19 0	1 0 0	1 3 0	1 3 0	1 8 0

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

COMPLETE OUTFITS—(*continued*).

"RUBY" Outfit No. 1 (for Hand or Stand).	Half-plate. 6½ x 4¼	7½ x 5	Whole-plate. 8½ x 6½	10 x 8	12 x 10
Camera, including Turntable and one Double Plate-Holder	5 11 6	6 16 0	7 17 6	9 12 0	12 0 0
Stand, three-fold, to fit Turntable	- 17 6	- 17 6	- 17 6	1 2 6	*Slide.* 1 2 6
Time and Inst. Shutter, with Speed Indicator fitted to Camera front	1 6 6	1 6 6	1 9 6	1 14 6	1 19 6
"Ruby" R.R. Lens	3 0 0	4 0 0	4 10 0	6 5 0	7 10 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	11 4 0	**13 8 6**	**15 3 0**	**19 2 6**	**23 0 6**
Waterproof Case (Pattern C)	- 16 0	- 18 0	1 0 0	1 3 0	1 8 0
"RUBY" Outfit No. 2 (complete outfit for Stereoscopic and ordinary Photography, for Hand or Stand).					
Camera, Turntable, and three Double Plate-Holders	6 9 6	8 0 0	9 7 6	—	—
Stand, three-fold, to fit Turntable	- 17 6	- 17 6	- 17 6	—	—
Time and Inst. Shutter, with Speed Indicator fitted to front of Camera, both for ordinary or Stereoscopic Photography	1 13 0	1 15 0	1 18 0	—	—
Stereoscopic, Division fitted	- 5 0	- 5 0	- 5 0	—	—
"Ruby" R.R. Lens	3 0 0	4 0 0	4 10 0	—	—
Pair of "Amber" Rapid Rectilinear Stereo Lenses	3 0 0	3 0 0	3 0 0	—	—
Bright Finder	- 8 6	- 8 6	- 8 6	—	—
	15 13 6	**18 6 0**	**20 6 6**	—	—
Waterproof Case (Pattern D)	1 0 0	1 2 0	1 4 0	—	—
Pair of "Ruby" Rapid Rect. Stereo Lenses	5 5 0	5 5 0	5 5 0	—	—
"RUBY" Outfit No. 3 (for Hand or Stand).					
Camera, Turntable, and three Double Plate-Holders	6 9 6	8 0 0	9 7 6	11 14 0	15 5 0
Stand, three-fold, to fit Turntable	- 17 6	- 17 6	- 17 6	1 2 6	*Slides.* 1 2 6
Time and Inst. Shutter, with Speed Indicator fitted to Camera front	1 6 6	1 6 6	1 9 6	1 14 6	1 19 6
Ross Zeiss Lens. Series IIIa	4 10 0	5 0 0	6 0 0	10 0 0	15 0 0
Wide Angle Lens. See page 41	2 10 0	4 0 0	4 0 0	5 0 0	—
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
(Cooke Lens may be substituted if preferred. See page 41.)	**16 2 0**	**19 12 6**	**22 13 0**	**29 19 6**	
Waterproof Case (Pattern C)	- 16 0	- 18 0	1 0 0	1 3 0	1 8 0
Focal Plane Shutter fitted to Camera, with Speed Indicator	2 8 6	2 16 0	3 3 6	3 13 6	4 13 6
"RUBY" Outfit No. 4 (for Hand or Stand).					
Camera, Turntable, and six Double Plate-Holders	7 16 6	9 16 0	11 12 6	14 17 0	20 2 6
Stand, three-fold, to fit Turntable	- 17 6	- 17 6	- 17 6	1 2 6	*Slides.* 1 2 6
Time and Inst. Shutter, with Speed Indicator fitted to Camera front	1 6 6	1 6 6	1 9 6	1 14 6	1 19 6
Focal Plane Shutter fitted to Camera, with Speed Indicator	2 8 6	2 16 0	3 3 6	3 13 6	4 13 6
Ross Zeiss Lens. Series VIIa	9 15 0	11 15 0	15 5 0	—	—
Wide Angle Lens. See page 41	2 10 0	4 0 0	4 0 0	5 0 0	—
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	25 2 6	**30 19 6**	**36 16 6**		
Waterproof Case (Pattern E)	1 3 6	1 5 6	1 7 6	1 12 0	2 0 0
Case for three extra Plate-Holders	- 7 6	- 8 6	- 9 6	—	—
Case for Legs	- 7 0	- 7 0	- 7 0	- 9 0	- 9 0
Brassbinding Camera	- 18 0	- 18 0	1 0 0	1 3 0	1 9 0
Brassbinding Plate-Holders.....each	- 4 0	- 4 0	- 5 0	- 5 6	- 7 0

PRICE LIST of the THORNTON-PICKARD CAMERAS.

SIZE OF PLATE IN INCHES	Quart'r-plate 4¼in. x 3¼in.			5in. x 4in.			Half-plate. 6½in. x 4¾in.			7½in. x 5in.			Whole-plate 8½in. x 6½in.			10in. x 8in.			12in. x 10in.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Camera only, "**Amber**" pattern..	2	13	6	3	2	6	3	8	6	4	5	0	4	18	6	5	17	6	—		
Camera only, "**Ruby**" pattern		—			—		4	2	6	5	4	0	6	2	6	7	6	0	9	2	6
Double **Plate Holder**	–	7	0	–	8	0	–	9	0	–	12	0	–	15	0	1	1	0	—		
Double **Slide** Bookform	–	14	0	–	16	0	–	17	6	1	0	0	1	2	6	1	7	6	1	12	6
Turntable fitted to either Camera..	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	5	0	1	5	0
Two-fold Stand to fit Turntable	–	13	0	–	13	0	–	13	0	–	13	0	–	13	0	–	18	0	–	18	0
Three fold Stand to fit Turntable	–	17	6	–	17	6	–	17	6	–	17	6	–	17	6	1	2	6	1	2	6
Top for Stand with folding Tripod screw ..	–	2	6	–	2	6	–	2	6	–	2	6	–	2	6	–	2	6	–	2	6
Time and Inst. **Shutter** fitted to front.. ..	1	1	0	1	1	0	1	3	0	1	3	0	1	6	0	1	11	0	1	16	0
Speed Indicator to Shutter	–	3	6	–	3	6	–	3	6	–	3	6	–	3	6	–	3	6	–	3	6
"Amber" Rapid Rectilinear **Lens,** with Iris	1	7	6	1	7	6	1	12	0	2	15	0	2	15	0	4	10	0	—		
"Ruby" Rapid Rectilinear **Lens,** with Iris..	2	10	0	2	10	0	3	0	0	4	0	0	4	10	0	6	5	0	7	10	0
Bright **Finder** for Hand Camera work.. ..	–	8	6	–	8	6	–	8	6	–	8	6	–	8	6	–	8	6	0	8	6
Larger Bright **Finder** for Hand Camera work	–	12	6	–	12	6	–	12	6	–	12	6	–	12	6	–	12	6	–	12	6
Shutter with Self-Capping Blind (*see page 11*)																					
Waterproof Cloth **Cases** (*see page 39*)																					
Brassbinding Camera, "Amber" or "Ruby"	–	15	0	–	16	6	–	18	0	–	18	0	1	0	0	1	3	0	1	9	0
Brassbinding Double Plate Holder or Slide	–	3	0	–	3	6	–	4	0	–	4	0	–	5	0	–	5	6	–	7	0
Aluminium Fittings to Camera and three Slides, extra	2	10	0	2	15	0	3	0	0	3	5	0	3	10	0	4	0	0	5	0	0

ALL OUR GOODS BEAR OUR NAME.

SIZE OF PLATE IN INCHES	Quart'r-plate 4¼in. x 3¼in.			5in. x 4in.			Half-plate. 6½in. x 4¼in.			7½in. x 5in.			Whole-plate 8½in. x 6½in.			10in. x 8in.			12in. x 10in.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Aluminium Binding, same as Brassbinding																					
Extra **Panels** for "Amber" Camera front ..	–	1	6	–	1	6	–	1	6	–	1	6	–	1	6	–	2	6	–	2	6
Do. for "Ruby" Camera front ..		—			—		–	2	6	–	2	9	–	2	9	–	3	0	–	3	6
Do. for **Shutter** front	–	1	6	–	1	6	–	1	6	–	1	6	–	1	6	–	2	6	–	2	6
Plate Carriers for smaller sizes of Plates outside measure (two required for each Plate Holder or Dark Slide)		—			—		–	1	4	–	1	6	–	1	8	–	2	0	–	2	6
Film Carriers for Cut Films (two required for each Plate Holder or Dark Slide...) each	–	–	5	–	–	6	–	–	6	–	–	10	–	1	0		—			—	
six...	–	2	3	–	2	6	–	2	6	–	4	6	–	5	6		—			—	
Stereoscopic Shutter Behind Lens, for a pair or one Lens only, fitted to Camera ..		—			—		1	9	6	1	11	6	1	14	6		—			—	
Speed Indicator, extra		—			—		–	3	6	–	3	6	–	3	6		—			—	
Adjustable Centres to Stereo. Shutter, extra .		—			—		–	5	0	–	5	0	–	5	0		—			—	
Stereoscopic Divisions, detachable		—			—		–	5	0	–	5	0	–	5	0		—			—	
Roll Holder		–			—		2	17	6	3	0	0	3	15	0	4	10	0	6	15	0
Fitting same to Camera, extra..		—			—		–	3	6	–	3	6	–	4	6	–	5	0	–	7	6
Complete Darkroom and Chemical Outfit to commence	–	15	0	1	0	0	1	5	0	1	10	0	2	0	0		—			—	
Dovetailed Box, partitioned for Camera, Plate Holders, Shutter, Chemical Accessories..	–	12	6	–	14	0	–	15	0	–	18	0	–	18	0	1	3	0	1	8	0
Strong Dovetailed Box, with Lock and Key, to contain everything for travelling or storing	–	17	6	–	19	0	1	0	0	1	3	0	1	3	0	1	8	0	1	15	0
Luggage Carriers, for Handles of Bicycle, per pair. *(See page 38)*	–	5	6	–	5	6	–	5	6	–	5	6	–	5	6		—			—	

The above Prices are subject to a Discount of 5 % for Cash with Order.

THE THORNTON-PICKARD MANUFACTURING CO. LTD. ALTRINCHAM.

Postal and Telegraphic Address: "THORNTON-PICKARD," Altrincham.
Telephone No. 69, Altrincham.

PRICE LIST of the THORNTON-PICKARD SHUTTERS.

SIZE, to fit on a Lens Hood or Tube up to Inches diameter—	1½	1⅝	2	2½	3	3½	4	4½	5
TIME & INSTANTANEOUS. STANDARD PATTERN...	18/6	18/6	20/6	23/6	27/6	32/6	37/6	42/6	47/6
Do. do. BEHIND LENS	21/-	21/-	23/-	26/-	31/-	36/-	41/-	46/-	51/-
Speed Indicator, 3/6 extra.									
If fitted with cord release instead of ball and tube for Hand Cameras, 1/- less.									
NEW METAL SHUTTER, *see page* 52.									
STEREOSCOPIC.									
TIME AND INSTANTANEOUS, at 3in. or 3¼in. centres	26/-	26/-	28/-	31/-	—	—	—	—	—
Do. do. BEHIND LENS do.	29/6	29/6	31/6	34/6	—	—	—	—	—
3½in. centres, 2/- extra; 3¾in. centres, 4/- extra.									
ADJUSTABLE PANEL FOR BEHIND LENS, extra 5/-									
Speed Indicator, 3/6 extra.									
SNAP SHOT, *for Instantaneous only*	10/-	10/-	12/-	15/-	—	—	—	—	—
Speed Indicator, 3/6 extra.									
SPECIAL, *for more Rapid Instantaneous*...	—	23/6	25/6	28/6	32/6	37/6	42/6	47/6	52/6
Speed Indicator, 3/6 extra.									
SILENT STUDIO	—	—	20/6	23/6	27/6	32/6	37/6	42/6	47/6

ALL OUR GOODS BEAR OUR NAME.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

FOCAL PLANE.

ENGLISH AND AMERICAN SIZES.			CONTINENTAL SIZES.	
4¼ by 3¼ (quarter-pl.)	£1 15 0	6½ by 4¼ (half-plate) £2 5 0	8½ by 6½ (whole-pl.)	£3 0 0	9 by 12 centimetres	£1 17 6
5 „ 4	2 0 0	7 „ 5 ... ... 2 10 0	10 „ 8	3 0 0	13 „ 18 „	2 12 6
6½ „ 4¼	2 5 0	7½ „ 5 ... ... 2 12 6	12 „ 10	4 10 0	18 „ 24 „	3 5 0
6½ „ 3¼	2 10 0	8 „ 5 ... ... 2 17 6	15 „ 12	5 10 0	24 „ 30 „	4 5 0

Speed Indicator, 3/6 extra.

Intermediate sizes are made to order at same price as next size larger.

ACCESSORIES.

SPEED INDICATOR, price **3/6** extra.

Pneumatic Ball and Tube, Ordinary Size, No. 0 (Ball, Tube, and Teat complete), price **1/6**

Do. do. No. 1, for Studio Shutter, Ball, and Tube only, price **2/-**; Teat, **1/-**

Do. do. Large Balls, Long Lengths of Tubing, and Teats, see page 18.

Patent Rubber Moulding, for fitting Shutters to Lenses, made in seven different thicknesses, **8d.** per foot.

Adaptors, for fitting Shutters to more than one Lens: **Rubber, 8d.** each; **Wooden,** lined with Rubber, **1/6** up to 2½in., **2/-** if larger.

Brassbinding Shutters, for hot and damp climates, **5/-** extra up to 3in size; larger sizes in proportion.

Self-Capping Blind. Both Time and Inst. and Snap Shot Shutters are fitted with this (see page 11), at the following extra cost: up to 2½in. size, price **5/-**; up to 3½in. **7/6**; larger sizes, and also Stereoscopic, **10/-**

Aluminium Fittings to Time and Inst. Shutters, **5/-** extra.

Extra Panels for Behind-Lens Shutters, ordinary patterns, up to 2½in. size, **1/6**; 3½in. size, **2/-**; 5in. size, **2/6**

Do. do. do. Stereoscopic Pattern, **2/-**; with adjustable centres, **5/-**

INSTRUCTIONS FOR ORDERING.

FOR ORDINARY SHUTTERS—Please send a narrow strip of paper just long enough to meet round the Lens Hood or Tube, NOT *an impression or pencil drawing. Insist upon having the Shutter made a good fit upon the Lens. The Shutters work equally well fitted to the Lens Hood or the Lens Body.*

FOR STEREOSCOPIC SHUTTERS—In addition to strip as above, please state exact distance apart of Lenses from centre to centre.

FOR FOCAL PLANE SHUTTER—This Shutter is fitted into the back of the Camera in the same way as the Reversible Back, and in fact, takes the place of it. The Dark Slide or Plate Holder fits into the back of the Shutter in the usual manner.

The cost of fitting is included if the Reversible Back with Focussing Screen and a Dark Slide or Plate Holder are sent to us when ordering, otherwise we supply the Shutter with an adapting frame which may be cut down and fitted to the required size by any cabinet-maker. If the Camera has no Reversible Back it is sufficient to send a Dark Slide or Plate Holder.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

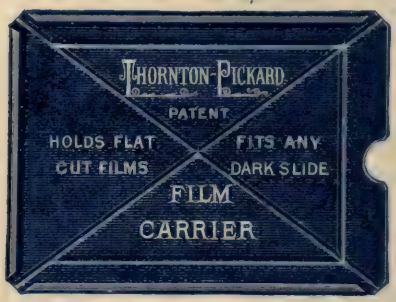
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Altrincham. Telephone No. 69, Altrincham.

THE THORNTON-PICKARD

PATENT

Film Carrier.



THIS Carrier is for Sheet or Cut Films. It will fit any make of dark slide or plate-holder that a plate will fit, and holds the film perfectly straight and flat.

The Carrier is made of extremely thin sheet metal; strength and rigidity are obtained by the indented ribs or corrugations that run in various directions.

The film is simply pushed into the grooves formed by the three turned-over edges, then the Carrier is placed in the dark slide just as though it were a plate. The notch at the end is provided in order that the film can be easily gripped by the finger and thumb for removal.

STIFF and LIGHT. BEST in the MARKET.

The Thornton-Pickard Patent Film Carrier combines the utmost stiffness and lightness possible, and in fact is the best Film Carrier in the market.

PRICE LIST.

To take one film.	Quarter-plate. 4¼" x 3¼"	5" x 4"	Half-plate. 6½" x 4¾"	7½" x 5"	Whole-plate. 8½" x 6½"
Price, each.....	**5d.**	**6d.**	**6d.**	**10d.**	**1/-**
Postage, extra	1d.	1d.	1d.	1d.	2d.
Price, in boxes, containing six	**2/3**	**2/6**	**2/6**	**4/6**	**5/6**
Postage, extra	2d.	2d.	3d.	3d.	3d.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.

Hints on Instantaneous Photography.

SUCCESSFUL Instantaneous Photography is easy and simple if a little care and judgment is used in observing the necessary points that apply to this kind of work. The most essential conditions are :—

Good light. A rapid plate. A shutter having a high co-efficiency. As full an exposure as the movement of the subject will allow. A suitable lens. Slow development with a very dilute developer when the plate is much under-exposed.

For Instantaneous Subjects as long an exposure should be given as the subject will allow. This depends upon the rate of motion and the distance from the Camera, both of which affect the movement of the image on the plate during the moment of exposure.

To find the Exposure required for a moving object. This may be obtained simply, as follows :—

The distance of the object from the Camera, measured in inches, must be divided by the number of yards per hour at which the object is travelling, and then multiplied by the focus of the lens in inches.

The result will be the fraction of a second, which is the longest allowable exposure that does not show movement in the resulting picture.

Putting this into a simple formula, we get

$$\text{Exposure in fractions of a second} = \frac{\text{Distance of object from Camera in inches.}}{\text{Yards per hour} \times \text{focus of lens in inches.}}$$

For example: Supposing that the object is 50 feet from the Camera and the focus of lens 6 inches, while the movement of the object is at the rate of 12 miles per hour, we get

$$\text{Exposure} \frac{50 \text{ (feet)} \times 12 \text{ (to reduce to inches)}}{12 \text{ (mls.)} \times 1{,}760 \text{ (yds. in a mile)} \times 6 \text{ (ins. focus)}} = \frac{600}{126720} = \frac{1}{211} \text{ of a second (about).}$$

This does not allow for movement of limbs, &c., which are always more rapid than that of the object itself, and a shorter exposure will be necessary in consequence; on the other hand, if the object is not moving broadside to the Camera, a longer exposure is allowable.

Below is given a table showing the correct exposure that should be given for various moving objects.

The table is made out for a distance from the Camera 100 times that of the focus of the lens; that is for a 6 inch focus lens at 50 feet, a 7 inch at 58 feet, an 8 inch at 67 feet, a 9 inch at 75 feet, or 12 inch at 100 feet.

	Towards the Camera.	At right angles to the Camera.
Man walking slowly, street scenes ..	1/15 sec. ..	1/45 sec.
Cattle grazing	1/15 ..	1/45
Boating	1/20 ..	1/60
Man walking, children playing, &c. ..	1/40 ..	1 120
Pony and trap, trotting	1/100 ..	1/300
Cycling, ordinary	1/100 ..	1/300
Man running a race, and jumping ..	1/150 ..	1/450
Cycle racing	1/200 ..	1/600
Horses galloping	1/200 ..	1/600

If the object is twice the distance, the length of allowable exposure is doubled, and *vice versâ*.

DEVELOPMENT.

FOR THE DEVELOPMENT OF INSTANTANEOUS PHOTOGRAPHS we use the three necessary constituents only, viz., Dry Pyro., Ammonia, and Bromide, in the following proportions: Pyrogallic Acid (dry), 2 grains; Bromide of Potassium, 1 grain; Liquid Ammonia, 880, 2 minims; Water, 1 oz. (The Bromide and Ammonia are conveniently kept as 10 per cent. solutions.) If under-exposed, dilute the developer with an equal bulk of water, and add 25 per cent. extra Ammonia.

IN EXTREME CASES we take the above developer and dilute it with five times its usual bulk of water; development will be very slow, but detail should appear all over the plate. In ten minutes add an amount of Ammonia equal to 25 per cent. of that already used, to make up for that which has evaporated. Repeat the same at the end of the next ten minutes. After the developer has been used for about half an hour, replace it by another made up as at first, and continue the operation in the same manner. After an hour probably no further detail may be coaxed out. Usually sufficient density is obtained at the end of an hour (and much sooner, except in extreme cases), but, if not, sufficient density may be obtained by applying a normal developer for a short time.

ROCK THE DISH. When using Pyro. the developer must be kept moving all the time, or the negative will be covered with spots, &c. We use a simple form of rocking table, which is kept in motion by a heavy weight. Four or five plates in a large or in separate dishes may be kept going at the same time, and attended to as required.

Cover the Dish. During development the dish should be covered with the lid of a large sized plate box, or other means, so as to avoid fogging the plate by the continuous light of the dark room lamp.

The Dark Room should be comparatively brightly illuminated with a yellow or orange light; development should take place in the darkest corner away from the light, and in the shadow of the person developing.

ENTER FOR OUR PRIZE COMPETITION (see page 50).

THE THORNTO

COMPETITION.

£200 IN PRIZES.

CLASS 1. Taken with the THORNTON-PICKARD "Amber" or "Ruby"

£100 will be given in Prizes for the best sets of Inst. Photographs **CAMERA & SHUTTE**

CLASS 2. Taken with the THORNTON-PICKARD

£100 will be given in Prizes for the best sets of Inst. Photographs **SHUTTER.**

£200

£50 of each £100 will be paid in Cash, the remainder in Apparatus of the Company's manufacture.

CLASS 1.—For Photographs taken with THORNTON-PICKARD Camera and Shutter.

FIRST PRIZE	**£50 in Cash.**
Second Prize	**£25 in Apparatus.**
Third Prize	**£10 in Apparatus.**
Three Prizes of £5 each	**£15 in Apparatus.**
	£100

CLASS 2.—For Photographs taken with THORNTON-PICKARD Shutter. Any make Camera, including Hand Cameras, allowed.

FIRST PRIZE	**£25 in Cash.**
Second Prize	**£15 in Cash.**
Third Prize	**£10 in Cash.**
Fourth Prize	**£5 in Apparatus.**
Ten Prizes of £3 each	**£30 in Apparatus.**
Fifteen Prizes of £1 each	**£15 in Apparatus.**
	£100

ALL OUR GOODS BEAR OUR NAME.

N-PICKARD

RULES.

1. **Date.**—All competing photographs must be sent in on or before September 1st, 1898. Any received after that day will not be eligible.
2. **Quantity of Prints.**—The prizes are offered for sets of prints. Each set must consist of four prints from different negatives. Any number of sets may be entered in either class. They may all be different subjects, or a series of the same subject in different styles or positions, but must be instantaneous exposures.
3. **Size of Prints.**—The prints may be any size, but must be printed direct from the negatives. Enlargements not allowed.
4. **Mounting of Prints.**—All prints must be mounted; this may be done in any way the competitor desires, but Framing is not allowed.
5. **Printing Process.**—The pictures may be printed by any process, on any kind of paper, but transparencies are not allowed. Composite negatives or printing from two or more negatives not allowed.
6. **Retouching.**—Ordinary spotting of defects on the prints or negatives will be allowed, but retouching will result in disqualification.
7. **Winning Pictures.**—These prints will become the absolute property of the Thornton-Pickard Manufacturing Company, Ltd. The negatives are to be loaned to the Company upon request for six months, during which time every care will be taken of them, but the Company cannot accept any responsibility for damage. The Company reserves the sole right to publish these winning pictures, and to use them for advertising or other purposes.
8. **Successful Competitors** will require to furnish such information as may be deemed necessary, as a proof of *bona-fides*, and to submit the Apparatus for inspection; also to state when and where it was purchased, if desired. The judges may require the negatives to be produced for inspection upon request before making their final decision.
9. **Apparatus Used.** Intending competitors in Class II. may use any make of Camera (including Hand Cameras) provided the genuine Thornton-Pickard Shutter, of our own manufacture and bearing our name, is used to take the photograph. Intending competitors in Class I. must use both our Camera and our Shutter. Either the "Amber," "Ruby," or any other pattern of Thornton-Pickard Camera may be used.
10. **Judges.**—The pictures sent in will be judged by the following gentlemen:—
    H. Snowden Ward, Esq. (Editor of the *Photogram*).
    A. Horsley Hinton, Esq. (Editor of the *Amateur Photographer*).
    Two Directors of the Thornton-Pickard Manufacturing Company, Ltd.
    Their decision shall be final.
11. **Sending in the Prints.**—Every print must be clearly marked in ink on the back of the mount with the following particulars:—
    (A) The name and address of the competitor.
    (B) The Class in which it is entered.
    (C) The exposure given, or full particulars of the circumstances under which taken.
    (D) The pattern of Shutter and Camera used.

    Packing.—It is important that the prints be carefully packed and forwarded, *carriage paid*, addressed:—The Thornton-Pickard Manufacturing Company, Ltd.,
    Competition, Altrincham, near Manchester.
    Date sent off.....

    Write a Letter as follows and send it by *separate* post, not in the parcel:—
    To the Thornton-Pickard Manufacturing Company, Ltd., Altrincham.
    Gentlemen,—I am sending you this day by....., carriage paid, ... photographic prints from negatives made with your Shutter (or Camera and Shutter). Please enter these in your Prize Competition, Class.....
    Yours faithfully,
    Name.....
    Address.....
    Write very clearly. Date.....
12. **No Director, Officer, or Employee** of the Thornton-Pickard Manufacturing Company, Ltd., nor any relative or assistant of any of the judges, will be allowed to compete.
13. **No competitor** can enter in both classes.
14. **The copyright** of the winning pictures shall be vested in the Company.

Those who have not already got them should buy a Thornton-Pickard Camera or Shutter, and enter for the above competition. The prizes are substantial and worth trying for. Everyone has a chance.

Preliminary Announcement. Subject to revision.

THE THORNTON-PICKARD NEW PATENT SHUTTER,

Known as The Thornton-Pickard ALUMINIUM Shutter.

THE above has been introduced to meet the requirements of those who want a cheaper Shutter than our old and well-known standard pattern. It retains, however, the special characteristics of the Thornton-Pickard manufactures, viz., excellent workmanship and acknowledged reliability.

The case of this Shutter is made of Aluminium, and is consequently very light. It is supplied either with the ordinary silver or with black finish.

N.B.—All orders are executed with the ordinary silver finish, unless otherwise specified.

The Pneumatic Ball and Tube, of our special best quality, is fitted to the Shutter, but if desired, it is supplied with a Cord Release instead; this is sometimes preferred when the Shutter is required for fitting into a Hand Camera.

Prices of the Thornton-Pickard Aluminium Shutter.

		1½ins.	1⅝ins.	2ins.	2½ins.
Time and Inst.,	silver finish, with Pneumatic Ball and Tube Release	12/6	13/6	16/6	19/6
Instantaneous,	silver finish, with Pneumatic Ball and Tube Release	8/-	9/-	10/6	13/6
	Speed Indicator, extra ...	3/6	3/6	3/6	3/6

For Hand Cameras these Shutters are specially made to order, at the same prices, but with black finish instead of silver finish, and mechanical instead of pneumatic release. The ordinary pattern and finish only kept in stock.

When ordering, please say whether the ordinary silver or the black finish is required; also whether the Shutter is to be fitted with Speed Indicator. Please send a strip of paper that just meets round the Hood or Tube of the Lens upon which the Shutter is required to fit.

For those requiring a cheap article, there is nothing in the market to equal this new Metal Shutter, but where beautiful finish and appearance are desired, such as can only be obtained with a French polished mahogany case, we strongly recommend our standard patterns, which give such universal pleasure and satisfaction.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Altrincham.



SKIPPING.

Exposure $\frac{1}{100}$ sec. Taken by Mr. J. E. Thornton, with a

THORNTON-PICKARD CAMERA AND FOCAL PLANE SHUTTER.

RIGHT





INTERESTED. DISGUSTED.

Exposure $\frac{1}{10}$ sec. Taken by Mr. G. A. Pickard, with a

THE

THORNTON-PICKARD SHUTTER

EVERY purchaser of a Hand Camera should insist upon having it fitted with a Thornton-Pickard Shutter. Most of the leading makers of Hand Cameras use it.

No other Shutter commands such an enormous sale because none other gives such good results.

The Thornton-Pickard Shutter
Is simple,
Reliable,
Perfect in design,
Perfect in construction,
Perfect in finish,
And it fulfils all requirements.

The Shutter is one of the most important parts of any Hand Camera. However good in design and construction the Camera may be, good results cannot be expected unless a good Shutter is used. Therefore, it is most essential to have the best Shutter obtainable.

Ask for the Thornton-Pickard Shutter and see that you get it.
Look for the name "THORNTON-PICKARD."
All our goods bear our name.
None genuine without it.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.
Altrincham.

ENTER FOR OUR PRIZE COMPETITION (see page 60)

Index.

PAGE.

2 ... Terms.
50 ... Prize Competition.

SHUTTERS.

6 ... Time and Inst. Shutters.
9 ... Behind-Lens do.
10 ... Stereo Shutters.
11 ... Self-Capping Blind Shutters.
12 ... Snap-Shot Shutters.
13 ... Special do.
14 ... Focal Plane do.
17 ... Studio do.
52 ... New Metal Shutters.

ACCESSORIES.

18 ... Balls and Tubes.
19 ... Rubber Moulding.
19 ... Adaptors.
20 ... Speed Indicator.
47 ... Miscellaneous Accessories.

CAMERAS.

23 ... Amber Camera.
23 ... Ruby do.

ACCESSORIES.

31 ... Recorder.
32 ... Stands.
34 ... Plate Holder.
37 ... Plumb Indicator.
48 ... Film Carrier.
45 ... Miscellaneous Accessories.

PRICE LISTS.

38 ... Waterproof Cases.
40 ... Lenses.
42 ... Complete Outfits.
44 ... Camera Price List.
46 ... Shutter Price List.
49 Hints on Instantaneous Photography.

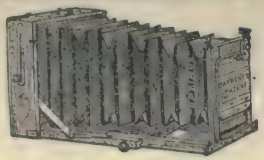
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Altrincham.

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Established 1854.

PRICE TWOPENCE.



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TELEPHONE No. 2772 GERRARD.



THE OLDEST PHOTOGRAPHIC JOURNAL IN THE WORLD

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One Year, 10s. 10d. Half Year, 5s. 5d. Quarter Year, 2s. 9d.

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It may also be obtained from all Booksellers, Photographic Dealers, and Railway Bookstalls, price 2d.

HENRY GREENWOOD & CO., Publishers,

See Notice of Removal, pages 558 and 1395.
See Advertising Scale, page 1396.

24 Wellington Street, London.

Telegraphic Address: 'Stereogram, London.'



THE

Sandell Works

Company, Limited.

REDUCTION IN PRICE.

IN *consequence of the great fall in the value of Silver we have been enabled to reduce the price of our* ***DOUBLE AND SINGLE THICKLY-COATED PLATES*** *to the ordinary Market Prices for the best SINGLE FILM PLATES, thus bringing within the reach of all the most perfect Plates in existence.*

THE SANDELL EXHIBITIONS,

Held this past season both at Norwood and Bond Street, were attended by the greatest possible success; the numbers of people who visited them were most enthusiastic in their appreciation of the results shown, the common expression was—'Marvellous!'

But it should be remembered there was nothing exhibited that cannot be easily accomplished by any one who chooses to work intelligently and literally carry out instructions. It is the simplest Plate imaginable to work.

[*See following pages.*

VIDE! LEGE! CREDE!

WHAT USERS SAY.

'Burlington Studio, 211 Lord Street, Southport,
July 2nd, 1897.

MR. JULIUS A. KAY.

'DEAR SIRS,— I have just got back from a holiday in South Devon, and find that your plates have been most satisfactory, both for interior and exterior. No other plates that I have used rendered the cloud effects so well as yours, and for interiors none equal them. Will you please send me?' &c., &c., &c.

Albert Square, Kirkwall,
July 15th, 1897.

MR. THOMAS KENT.

'GENTLEMEN,—A short time ago I had a sample half-dozen of your double plates, and to-day I had an opportunity of making my first exposure. The subject was an interior, a window lighted from the south being included in the view. I stopped down the lens to *f*/44, and gave 10 minutes' exposure at 11 a.m. I did not adhere to your formidable instructions, but used the simple Pyro soda developer. Development was complete in three minutes, and the result is perfect—**no Halation, no Fog, no Frilling.** The details of lace curtains against the glass is preserved. Of course I can well imagine what the result would have been on an "Ordinary" plate, and I shall certainly use the Sandell for future work. The photographer who declines to use it neglects his own interests. I wish you all the success you deserve for your great achievement in providing a plate wherewith a photographer can obtain perfect negatives, free from halation, of subjects of extreme contrasts. You are at liberty to make use of this unsolicited testimonial to the merits of your plates.'

'234 Westgate Road, Newcastle, *August 13th*, 1897.

MR. J. C. BLACKHAM writes:—'I get splendid results on your plates.'

'Tollcross, near Glasgow, *August 26th*, 1897.

J. MARSHALL, Esq.

'DEAR SIRS,—Nearly four years ago I bought a box of your plates, 'Sandell General (now double). These I used at that time all but one, and got some splendid negatives, one especially, during the severe winter three years ago—a dark, disused quarry, large dark holes in the rocks, bright snow and icicles. The exposure given brought out every detail in the rocks, and yet the snow and ice were perfect. I haven't been able to touch a camera for nearly three years, till a few weeks ago I had occasion to photograph a large auratum lily in a hot-house I exposed three plates of an ordinary well-known make, and got very little detail in the shadows with normal exposure; with an over-exposure I got flatness and halation. I then tried this one plate remaining in your box, and judging it might have lost some of its sensitiveness, I gave it six times the proper exposure as calculated by Watkins' meter. The result was magnificent, and there was not a single blemish on the plate. I am glad to note that you have reduced your plates to ordinary prices, and shall use them only in the future.'

'Bolton, *September 1st*, 1897.

A gentleman writes of his brother, who with little practice was a very poor judge of exposure:—'I gave my brother the dozen Sandell II. Plates, instructed him to stop down at *f*/32, and expose for five seconds. I have finished developing, and every plate has yielded a good negative. Some needed reduction, others not. The result is this: last year, out of two dozen plates he had only two first-rate negatives, the rest were decidedly poor. This year he will have, out of one and a half dozen plates, fourteen negatives he need not be ashamed to show his friends. Out of these twelve were on Sandell II. and one on Sandell I. plates.'

☞ **NOTA BENE.—Sandell Plates are now sold at ordinary prices.**
New Price List, Exposure Guide, &c., free on application.

The SANDELL WORKS CO., Ltd.,

SOUTH NORWOOD, LONDON, S.E.

Telegrams: 'STEREOGRAM, LONDON.

Managing Director: J. T. SANDELL.

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Keeps Indefinitely. The Plate to use.

LANTERN SEASON, 1897-98.

THE SANDELL I

THICKLY-COATED

LANTERN PLATE,

1/- per dozen.

NO HALATION.
COLLODION BRILLIANCY.
PERFECT GRADATION.
ALL COLOURS AT WILL.
THINNEST GLASS.
ONCE USED, ALWAYS USED.
CAMERA OR CONTACT.

THE DEVELOPER PAR EXCELLENCE.

No. 1.		No. 2.	
Pyro	1 oz.	Liquid Ammonia	·880, 1 oz.
Sulphite Soda	3 ozs.	Water	to 10 ozs.
Citric Acid	120 grs.	No. 3.	
Water	to 10 ozs.	Bromide Ammonium	2 oz.
		Water	to 10 ozs.

Take 20 minims of each and dilute to 1 oz. with water.
Development of correct exposure should not exceed FOUR minutes for dark tones.
Increase exposure and No. 3 for warmer tones.

THE SANDELL WORKS CO., Limited,
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COMPLETE PRICE LIST OF THE SANDELL WORKS CO.'S DRY PLATES, FILMS, &c.

In this column W. means Warnerke Sensitometer.	INCHES.													CENTIMETRES.									
	3¼×3¼	4¼×3¼	5 × 4	6½×3¼ & 6½×3½	6½×4¼	6½×4½	7¼×4¼	7½×5	8 × 5	8½×6½	9 × 7	10 × 8	11 × 9 & 13 × 8	12×10	15×12	9 × 12	10×13	12×16	12×16½	13×18	15×21	18×24	21×27	24×20	30×40
Sandell Single I. Thickly coated Series ...																									
Landscape, 18 W.	per doz: -																								
Ordinary, 22 W.	1/0	1/0	1/7	2/2	2/2	2/3	2/10	3/5	3/9	4/3	5/0	7/3	10/6	10/6	18/0	1/3	1/10	2/3	2/3	2/6	3/9	5/0	7/9	10/0	20/0
Special Express, 28 W. ...																									
Lantern and Transparency																									
Röntgen, 28 W.																									
Films, Landscape, Special Express, Röntgen	per doz:—																								
Transparency Finest Ground Glass) ...	1/6	1/6	2/6	3/0	3/0	3/6	4/0	4/6	5/0	6/0	8/0	10/0	14/6	14/6	23/0	1/10	2/4	3/6	3/6	4/0	5/9	7/6	10/9	14/3	27/6
Matt Opals																									
Sandell Double II, 28 W. ...	per doz:— 1/6	1/6	2/6	3/3	3/3	3/8	4/6	5/3	6/0	6/6	8/-	11/0	16/0	16/0	28/-	1/10	2/10	3/8	3/8	4/0	5/8	8/0	11/8	15/0	32/6
Sandell Triple III, 28 W. ...	per ½ doz:— 1/3	1/3	2/0	2/6	2/6	3/0	3/6	4/0	4/6	5/6	6/6	8/6	12/0	12/0	19/6	1/9	2/2	3/0	3/0	3/9	4/10	6/6	9,0	12/0	22/6
Sandell Films II., 28 W. ...	per doz:— 2/0	2/0	3/3	4/3	4/3	4/9	5/6	6/9	7/3	8/9	9/6	12/6	18/0	18/0	34/0	2/6	3/3	4/9	4/9	5/9	8/6	10/6	14/6	16/6	36/6

The S.W. Developers, in strong cardboard cases { Pyro-Potash, 2 pints 3/9; Lantern, 2½ ,, 3/6 | Hydrokinone Metol, 2½ pints ... 2/6; Metol, per gallon, 6/0; 2 gallons, 11/0 | Metol, 2 pints ... 2/0

Orthochromatic Medium, 1/- bottles. Screen Discs, 1/- boxes. S.W. Perfection Varnish, ½ pints, 1/6; pints, 3/0.

In ordering Discs send inside diameter of lens hood.

[See preceding Page.]

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CANTILEVER ENLARGING APPARATUS

Prices from £2 10s. to £105.

Manufactured in British, American, Indian, & Continental Sizes & Patterns.

My Specialty.—The Neatest and Best Enlargers.

A. SERIES FITTED WITH OPENING STAGE TOP FOR LARGER PLATES.

THE STANDARD PATTERN.

For Oil. A. SERIES.



Fig. 1.

A. SERIES IS BEST MAKE AND OFFERS GREATEST SCOPE.

THE INDIAN PATTERN.

Highest Finish. Fitted for Oil. A. Series.

DESIGNED TO WITHSTAND TROPICAL CLIMATES.



Fig. 2.

BRASS . . . . BOUND.

Altogether a very handsome form of the Instrument, frequently taken by home buyers.

THE CANTILEVER making Lantern Slides by reduction.

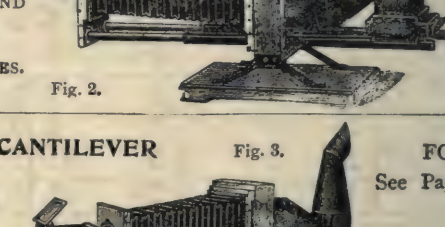


Fig. 3.

FOR PRICES, See Pages 207 and 208.

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Hume's Cantilever Enlarging Apparatus.

The new 4-inch size for Professionals and Amateurs.

Makes Enlargements 1 *to* 20 *diams.,* ¼ *in. Head to* 5 *ins.*



Fig 4.

SPECIAL ADVANTAGES.—Strong light, short exposure, easy vignetting; good Objective, Enlarges Cartes to 24×18, Cabinets to Life Size. Gap Stage, takes plates up to 15×12 for heads and busts out of groups. Makes Enlarged Negatives for Prints in different processes. *A smart little Money Maker if put into regular use.* It Enlarges Kodak and Frena Film Negatives.

PRICE complete, with the **Enlarging Objective.**
OIL PATTERN, £4.
PACKING CASE, 1*s.* 6*d.*

'I am perfectly satisfied with the small (4-inch) Cantilever. It is just what I required.'

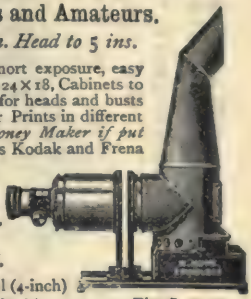


Fig. 5.

IMPROVED B PATTERN FOR OIL.

Fig. 6.



THE NEW C PATTERN FOR OIL.

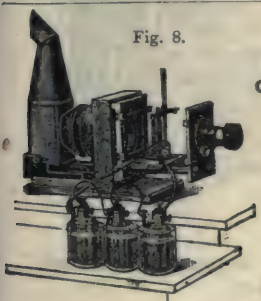
Quarter-Plate, 50/-.

Box, 1/6.



Fig. 7.

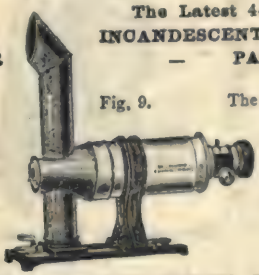
Fig. 8.



The CANTILEVER as Physics Projection Lantern.

The Latest 4-inch INCANDESCENT — PATTERN.

Fig. 9.



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HUME'S CANTILEVER ENLARGING APPARATUS.

THE A Series, INCANDESCENT Pattern, With BYE-PASS.
Fig. 11.

Remarkably Neat Patterns.

The B Series, INCANDESCENT Pattern, PLAIN BURNER.
Fig. 13.

THE LIME LIGHT B Pattern.
Fig. 10.

THE LIME LIGHT. A. Series.
Fig. 12.

Special Trade Requirements a Feature. Correspondence Invited.

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THE A Series, ELECTRIC ARC Pattern.

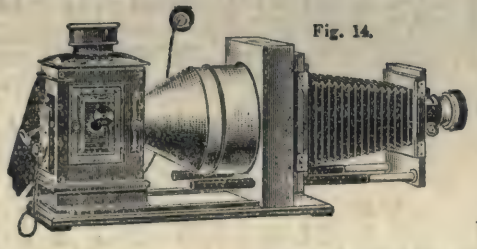


Fig. 14.

FOR RAPID TRADE and PROCESS WORK.

THE ELECTRIC ARC, B Pattern.

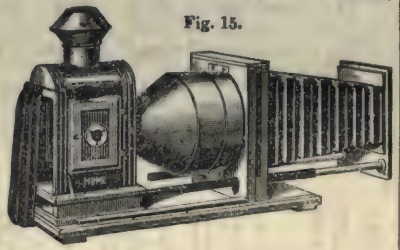


Fig. 15.

Exceedingly convenient Patterns where Current is laid on.

HUME'S ENLARGING OBJECTIVES.



Fig. 16.

The ENLARGING Objectives supplied with the Apparatus are warranted to give good definition. They collect and pass a large amount of light, and so shorten the exposure.

NEWCASTLE-ON-TYNE, *10th June,* 1892.—'I have tested the two Objectives you kindly sent me for trial, and have decided to keep the 7-in. at £3 5s.; it **works very well,** and is, of course, much **faster than my own.**'
BEXLEY HEATH, KENT, *1st January,* 1893.—'The style of it is good, and the Lenses are both very good indeed.'

WILLIAM HUME, 1 Lothian Street, EDINBURGH.

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TABLE OF PRICES FOR THE CANTILEVER ENLARGING APPARATUS

Including Packing, but without the Enlarging Objectives or Electric or Limelight Gear.

Before ordering compare with the fuller description in body of List.

GOODS READY. MY SPECIALTY. NO DELAY.

THE IMPROVED A SERIES. Best Finish and Opening Stage Top for Large Plates.

Condenser.		Plates fully covered.		The Standard Pattern for Oil Light. Fig. 1.	The Indian Pattern for Oil Light. Fig. 2.	The Standard Pattern for Incandescent Gas with bye-pass Fig. 11.	The Lime-Light Pattern with best Mahogany Lantern. Fig. 12.	The Electric Arc Pattern with best Mahogany Lantern. Fig. 14.	Lime-Light Pattern with Russian Iron Lantern.	The Electric Pattern with Russian Iron Lantern.	When a suitable size of the Enlarging Objective is required, add as under. Fig. 16.
Inches.	Centimetres.	Inches.	Centimetres.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
4	10·2	3¼×3¼	8·3× 8·3	4 1 6	...	4 11 6	This size is	sold complete	with the	Enlarging	Objective.
5¼	14	4¼×3¼	8·3×10·7	5 6 6	6 16 6	6 1 6	10 2 6	10 12 6	6 7 6	6 15 0	1 15 0
6	15·2	4¼×3¼	9 ×12	5 17 0	7 7 0	6 12 0	10 12 6	11 2 6	6 17 6	7 5 0	2 15 0
6½	16·5	5 ×4	10 ×12·7	6 14 0	7 12 0	7 ∿ 0	11 10 0	12 0 0	7 14 6	8 2 0	2 15 0
7	17·8	5½×4½	10·7×14	7 9 0	7 17 0	8 4 0	12 5 0	12 15 0	8 10 0	8 17 6	3 5 0
8	20·3	6½×4½	12 ×16	8 10 6	10 2 6	9 5 6	13 7 0	13 17 0	9 17 0	10 5 6	3 5 0
8½	20·8	6½×4½	12 ×16·5	9 7 6	10 17 6	10 2 6	14 4 0	14 14 0	10 14 0	11 2 6	3 5 0
9	22·8	7½×5	13 ×18	11 13 0	14 3 0	12 8 0	16 10 0	17 0 0	12 15 0	13 2 6	6 0 0
10	25·4	8½×5½	14·6×20·9	12 14 0	16 14 0	13 9 0	17 10 0	18 0 0	13 15 0	14 2 6	6 15 0
11	27·9	9 ×7	17·8×22·8	16 19 0	20 4 0	17 9 0	21 16 6	22 6 0	17 11 0	17 18 6	6 15 0
12	30·5	9½×7½	18 ×24	21 15 0	24 5 0	22 5 0	25 10 0	26 15 0	22 12 0	22 18 0	6 15 0
13	33	10 ×8	21 ×26		Special Export Packing extra.						
16	40·6	12 ×10	25·4×30·5								
20	50·8	15 ×12	36 ×30·5								

THE IMPROVED B PATTERNS.

Condenser.		Plates fully covered.		For Oil. Fig. 6.	Gas. Fig. 13.	Lime. Fig. 10.	Arc. Fig. 15.
Inches.	Centimetres.	Plate.	Centimetres.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
5	12·7	½	7·6×10·2	3 4 6	3 15 0	4 9 6	4 16 6
6	15·2	½	9 ×12	4 6 0	4 16 6	5 12 0	5 17 0
8	20·3	½	12 ×16	6 8 6	6 19 0	7 18 6	8 3 0
9	22·8	½	13 ×18	8 11 0	9 1 0	10 4 0	10 11 6

THE NEW C PATTERN.

Condensers.		Plates fully covered.		For Oil. Fig. 7.
Inches.	Centimetres.	Plate.	Centimetres.	£ s. d.
5	12·7	½	7·6×10·2	2 11 6
6	15·2	½	9 ×12	3 2 0

[See preceding and following pages.

ACCESSORIES for the CANTILEVER ENLARGING APPARATUS.

RAILS AND INVERTED V BLOCKS,
to facilitate correct adjustment to and from easel.

For lanterns 5½ 8½ 9 10 11 inches.
Price ... ... 10/- 14/- 20/- 20/- 23/- the Set

EASELS.

Easel, plain pattern, reversing on foot for laying or fixing on same bench with lantern.

For pictures up to 24×18 inches, price 7/6.

EASEL for use in making enlarged negatives, consisting of a frame 30×30 inches, with fine focussing screen for viewing the image from behind, with lever focussing movement, and carriers for 15×12, 12×10, 10×8, and 8½×6½. £2 2s.

FINE SCREW MOTION,
Triple Thread, to facilitate focussing with non-racking lenses.
Price, with fittings for any size Lantern to 11 inches, 12/6.

FITTING CUSTOMER'S OWN LENS.

Fitting customer's own lens, when suitable, including fitting, centreing, testing, wood centre, new brass flange, and yellow glass cap, from 7/6.

Fitting customer's own lens, when suitable, including the above items, but requiring structural alterations, new cone, metal ring, slipping tubes and bellows, testing and adjusting to centres for good discs. Charged extra as required.

Fitting customer's own lens, when suitable, for making lantern slides by reduction, finding distances and centres for good discs, mounting customer's camera, bracket, making structural alterations upon enlarger if necessary, testing and proving correct. Charged extra as required.

CONE ADAPTER,
with brass screw flange, when necessary to make long focus lenses give small amplitudes —i.e., 1 or 2 diameters, from 5/6.

EXTRA CARRIERS,
with any size opening frame will admit of.

For Stages of 5½ 8½ 9 10 11 in. Lanterns
Outside Size 6½ 9 10 11 12 ins. square.
Price, each 3/- 4/- 5/- 5/- 6/- for **A** Series
Indian Brass Bound are higher.
B *Series, plain, are lower.*

CIRCULAR WOODEN FRONTS
For fitting on lenses ... ... 1/6, 2/-, 2/6.
Square loose Fronts for Indian Series are higher.

GLASS CHIMNEYS.
For oil lamps ... ... 6d. and 9d. each
For incandescent burners 6d. „ 8d. „

MICA CHIMNEYS.
For incandescent burners... ... ... 1/2
Mantles should be bought locally.

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— TERMS. —

NET.—Prices are strictly net for Cash, without discount, and payable upon presentation of invoice.

APPROVAL.—Intending purchasers can have the apparatus on approval for inspection either by depositing the value in full or by properly introducing themselves. Carriage charged one way only.

CARRIAGE PAID.—When cash accompanies order, the goods are delivered free to any station (or port of shipment) in the United Kingdom.

READY.—Goods ready in all sizes quoted in the body of list, tested and packed for prompt delivery. Other Continental and American sizes catalogued in above table are kept in a forward state, ready for finishing upon short notice.

REMITTANCES.—Remittances from abroad may either be made direct, or through a Banker or other Correspondent in this country, instructed to pay value in exchange for shipping documents.

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HUME'S PRIZE OUTFIT, £5 5s.

Net Cash with Order, Carriage Paid, £5.

THE FAVOURITE SIZE.—Half-plate Camera with one double dark slide, Rapid Rectilinear Lens, Iris Diaphragm, Roller Blind, Instantaneous Shutter, Pneumatic Release, Threefold Tripod, and Waterproof Travelling Case.

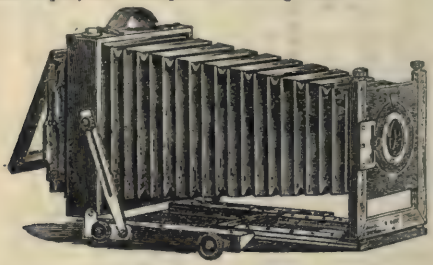


Fig. 18.



Fig. 21.



Fig. 20.



Fig. 23.



Fig. 22.



Fig. 19.

Printed Instructions — Brief, Simple, Explicit.

How to Photograph—How to Focus—The Iris Diaphragm—Correct Exposure—Instantaneous Pictures—How to Develop—Finishing the Work, &c.

HUME'S PRIZE OUTFITS in Larger Sizes.

For Plates	8½×6½ in. ...	10×8 in. ...	12×10 in.
Price	£8 0 0 ...	£10 10 0 ...	£13 10 0
Accessories, as noted	1 10 0 ...	1 15 0 ...	2 5 0
Extra Dark Slides	0 19 0 ...	1 3 0 ...	1 7 0

Subject to 5 per cent. for Cash with order, Packing and Carriage free.

Facilities will readily be granted to intending purchasers for satisfying themselves as to the good workmanship and performance of these sets.

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NET CASH WITH ORDER, ... £5.

This Set being light in weight is well suited for ladies.

Half-plate Size, 6½ × 4¾ in.

SINCE its introduction to the Public this popular Set has given the greatest satisfaction, and has already achieved a success almost equalling that of the Cantilever Enlarging Apparatus.

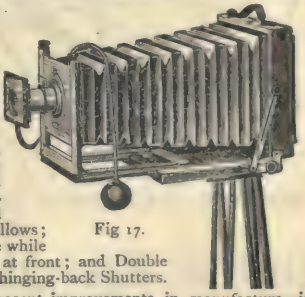


Fig 17.

THE CAMERA (Figs. 17 and 18).—Fine polished mahogany body, with every movement required in all branches of Photography, viz., Rising and Falling Front, Swing Back and Guides to show when plate and base-board are correctly at angle 90°, with **Spirit Level** on top for Architectural and other work; Reversing Frame to take upright or horizontal pictures, hinging-back attached Focussing Screen; Rack and Pinion Movement Adjustments for both wide-angle and long-range subjects; long-draw leather bellows; Catch to prevent accidental drawing of slide while in position; removable circular Lens Board at front; and Double Dark Slide with metal catches and double hinging-back Shutters.

THE LENS (Fig. 19)—the result of recent improvements in manufacture—is a **New Rapid Rectilinear**, fitted with **Graduated Iris Diaphragm.** It takes the most brilliant pictures, covering the plate sharply from centre to margin. It is suited to all classes of photographic work—Instantaneous, Architectural, Interiors, Landscapes, Groups, and Portraits, copying illustrations, and **by reduction** making Lantern Slides.

THE SHUTTER (Roller Blind Pattern), Fig. 20, **for Instantaneous Exposures.**—Enables the operator to secure sharp pictures of moving objects, such as Animals, Children, Games, Cloud and Water Effects, breaking Waves, Shipping, and an infinite variety of Instantaneous Views, without any trace of blurring. The speed may be varied to suit the light and the subject; and being fitted with rubber tube and ball for pneumatic release, no vibration whatever is communicated to the Camera while making the exposure.

THE TRIPOD (Figs. 21 and 22) is very elegant, compact, and light, without loss of rigidity. It is threefold with sliding leg, and, fitted with patent **self-locking catch,** is readily adaptable to all inequalities of ground, and packs into very small space.

THE CASE (Fig. 23) **is of stout Waterproof Cloth,** leather bound, with shoulder strap. It can hold all field requisites except the stand legs, viz., Camera, Slides, Lens, Shutter, Tripod Head, Focussing Cloth, Focussing Lens, Notebook, &c.

The whole set is neatly boxed ready for despatch.

When Cash accompanies Order, HUME'S PRIZE OUTFIT will be packed and sent to any Station in the United Kingdom, carriage paid, for £5. Extra Dark Slides with Spring Catches, each 12s. 6d.

ACCESSORY APPARATUS, CHEMICALS, ETC.

Focussing Lens, 1 doz. Dry Plates, Ruby Lamp, Ruby Paper, Dusting Brush, Plate Lifter, 2 Porcelain Trays, 2 Ebonite Trays, 2 Bls. Developer, 1 Bl. Varnish, 2 Bls. Fixing, 1 Bl. Alum, 1 Bl. Toning, Sensitized Paper, Printing Frame, Cutting Shape, 1 doz. Mounts packed in case.

PRICE £1 1s.

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[*See preceding pages.*



THE OLDEST AND MOST INFLUENTIAL JOURNAL IN THE WORLD.

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HENRY GREENWOOD & CO., 24 WELLINGTON STREET, STRAND, LONDON.

For Advertising Scale see pa e 1396.
For Notice of Removal see pp. 558 and 1395.

The New Silver Lantern Screen (Patent).

LEWIS WRIGHT & ANDERTON'S

SILVER LANTERN SCREEN

WILL practically more than double the illuminating power of oil lamp, incandescent gas, or acetylene.

If limelight or electric arc be your illuminant, you have at command the means of greatly increasing your light; or if you do not desire such increase, you can retain your present illumination at one half your present expenditure of gases or electricity.

PRICES (with Roller and Moulding).

5	feet square	£1	5	0	9	feet square...	£3	7	6
6	,, ...	1	15	0	10	,, ...	4	0	0
7	,, ...	2	5	0	12	,, ...	5	10	0
8	,, ...	2	15	0					

'I expected a better illumination with it than with an ordinary opaque screen, and I was agreeably surprised to find the increase nearly double what I had expected.'
Editor, *Optical Magic Lantern Journal.*

'We were astonished at seeing the enormous increase in brilliancy which is attained by this screen.'—*Photographic News.*

SOLE MAKERS— FROM ALL DEALERS.

R. FIELD & CO. Lantern Manufacturers, **142 Suffolk St., Birmingham.**

ESTABLISHED 1817.

JAMES MOORE,

258 Heneage Street, Birmingham,

SOLE BRITISH MANUFACTURER OF

FERROTYPE PLATES,

IN BLACK AND CHOCOLATE.

MATTS, PRESERVERS, COMBINATIONS, TRAYS, ALBERT TRAYS, CASES, &c.

Matt and Preserver combined for Transparency, Magic Lantern, and Stereoscopic Slides (Registered).

THE CHEAPEST HOUSE IN THE TRADE.

For Home and Exportation.

KINDLY NOTE CHANGE OF ADDRESS.

GWYER'S HIGH . . POWER

LIME LIGHT JETS

NEW DESIGN FOR 1898.



THESE Jets, which are constructed on a New Principle, are unsurpassed for Power and Quality of the Light. They are fitted with new Cut-off and Screw Valve Adjustment. Special Terms for Short Focus Condensers.

PENDANT SATURATORS

Are the most Economical for Lantern Projection, Cinematographs, Enlarging, &c.

TRY ONE. FREE TRIAL IS ALLOWED.

WRITE FOR PROSPECTUS TO THE MANUFACTURERS,

J. S. WILLWAY & SONS,

St. Augustine's, BRISTOL.

1888, PRIZE MEDAL FOR EXCELLENCE OF APPARATUS.



SHARP & HITCHMOUGH

Photographic Instrument Makers,

GOVERNMENT CONTRACTORS,

101 & 103 DALE STREET, LIVERPOOL.

WORKS & WAREHOUSE: GRESHAM BUILDINGS.

Specialties for Home and Export.

CAMERAS, LENSES, STANDS,
DRY PLATES, CHEMICALS,
CARDS, MOUNTS,
FRAMES AND SUNDRIES,
OPTICAL GOODS,
SCIENTIFIC APPARATUS FOR
HOME AND EXPORT.

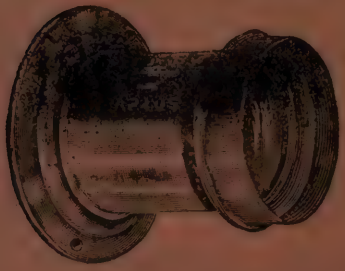
MECHANICAL WORK UNDERTAKEN.
INVENTIONS WORKED OUT
FOR
AMATEUR MECHANICS.
PHOTOGRAPHIC PRINTING AND
ENLARGING.

Special Quotations to large buyers. Foreign Indents should be addressed to

SHARP & HITCHMOUGH, Liverpool.

APLANATIC DOUBLETS.

Guaranteed Quality.



ADMIRABLY ADAPTED FOR GROUPS, LANDSCAPES, ARCHITECTURE, COPYING, ENLARGING, and INSTANTANEOUS WORK.

PRICES. TIT

Diameter of Lens.		Approximate Equiv. Focus.	Waterhouse Diaphragm.	Iris Diaphragm.
1 inch	$4\frac{1}{4}\times3\frac{1}{4}$ & 5×4	... ... $5\frac{1}{2}$ in.	£1 1 0 ...	£1 7 0
$1\frac{1}{2}$,,	$6\frac{1}{2}\times4\frac{3}{4}$	... ... $8\frac{1}{4}$ in.	1 5 0 ...	1 13 0
$1\frac{3}{4}$,,	$8\frac{1}{2}\times6\frac{1}{2}$	... ... $12\frac{1}{4}$ in.	2 0 0 ...	2 5 0
$2\frac{1}{8}$,,	10 ×8	... ... $15\frac{3}{4}$ in.	3 0 0 ...	3 10 0

Special Cheap Series of 'APTUS' LENSES

With Iris Diaphragms. ¼-plate, **21s.**; ½-plate, **25s.**

Are Unsurpassed for Fine Definition and General Excellence.

'APTUS' RAPID RECTILINEAR LENSES

With Adjustable Diaphragms.

From Mr. J. FINNIE, Callander, Photographer, *April 11th*, 1891:—

'I have given the Lens (Euryscope) fair trial, and find it just PERFECTION.'

From Mr. H. CONWAY, Rhyl, N.W., *February 9th*, 1891:—

'I like the Lens (Aplanatic Doublet) you sent me very well indeed. I will order large R. R. from you shortly.'

From Mr. J. BURGOYNE, Birmingham, *June 22nd*, 1891:—

'I have one of your Lenses in regular use, and a better Lens could not be.'



We are constantly receiving letters expressing satisfaction at the quality of our Lenses.

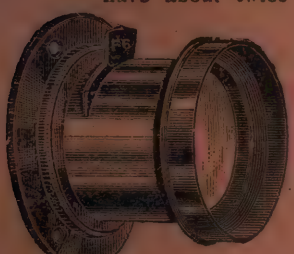
RAPID RECTILINEAR.

PRICES. TIT

Size covered.	Diameter.	Focus.	Waterhouse.	Iris Dphrgms.	Size covered.	Diameter.	Focus.	Waterhouse.	Iris Dphrgms.
5 ×4	1	$4\frac{3}{4}$ in.	£1 8 0	£1 14 0	10 ×8	$2\frac{1}{2}$	$12\frac{1}{2}$ in.	3 10 0	4 0 0
7 ×5	$1\frac{1}{4}$	$7\frac{1}{2}$ in.	1 12 0	2 0 0	12 ×10	$2\frac{1}{2}$	$14\frac{1}{2}$ in.	5 0 0	5 15 0
$8\frac{1}{2}\times6\frac{1}{2}$	$1\frac{1}{2}$	$10\frac{1}{2}$ in.	2 10 0	3 0 0	15 ×12	$2\frac{1}{2}$	$19\frac{1}{2}$ in.	6 12 0	7 16 0

SHARP & HITCHMOUGH'S 'APTUS' EURYSCOPE, or R.R. PORTRAIT SERIES.

THE Lenses are of special optical glass, and have about twice the rapidity of the Rapid Rectilinear Series, working *f*/6, specially good Lenses for Portrait work in Studio, or Groups in the open air; they are equally good for Landscape or Architectural work with smaller stops. TTT



Size Covered.	Focus.	Diam.	£ s. d.	Iris. £ s. d.
5×4 ...	4¾ in. ...	1⅛ ...	1 13 0 ...	2 0 0
7×5 ...	8¼ in. ...	1½ ...	2 5 0 ...	2 14 0
9×7 ...	10½ in. ...	2 ...	3 18 0 ...	4 10 0
10×8 ...	12½ in. ...	2⅝ ...	7 10 0 ...	8 10 0

Dist. Hoopstad O.F.S., S.A., Steenbokpan,
October 6th, 1891.

To Messrs. Sharp & Hitchmough, 101 & 103 Dale Street, Liverpool.

Dear Sirs,

I have the pleasure to inform you of the arrival of Euryscope lens and shutter which reached in safety and good order. The new mount metal is a marvel of lightness, the lenses satisfactory in every way, whilst the Iris diaphragm works smoothly, without any perceptible friction. I am perfectly satisfied with the goods you have supplied.

I am, dear Sirs,
Yours faithfully, F. STOW.

APTUS' WIDE-ANGLE DOUBLETS
RECTILINEAR, REVOLVING DIAPHRAGMS.

Specially adapted for Architecture; being of short focus and wide angular aperture, can be used to advantage when very close to the subject. It is also useful for landscapes as well as copying. The smaller ones give beautiful **Lantern Slides,** the definition being exceptionally crisp. TTT

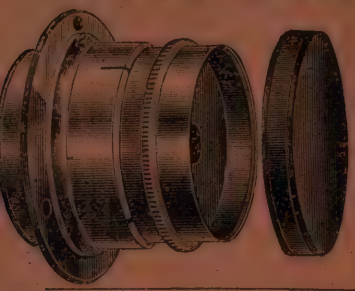


Size.	Focus.	Diam. of Lens	£ s. d.
4¼ × 3¼ in. ...	2¾ in. ...	1 in. ...	1 10 0
6½ × 4¾ in. ...	4⅝ in. ...	1 1/16 in. ...	1 17 0
8½ × 6½ in. ...	6¼ in. ...	1 5/16 in. ...	2 15 0
10 × 8 in. ...	7 in. ...	1 7/16 in. ...	4 10 0
12 × 10 in. ...	8 in. ...	1 9/16 in. ...	6 0 0

Will Clients abroad please address all Indents to

SHARP & HITCHMOUGH, LIVERPOOL.

'APTUS' SNAP-SHOT LENS. TTT



5-in. Focus Achromatic Jena Glass.

Exceptional Quality for ¼-plate Pictures.

Wonderful definition, with large aperture.

UNMOUNTED, 2s. 6d.

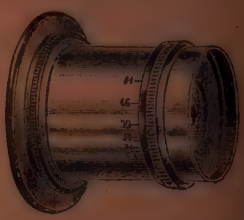
IN SLIDING MOUNT, 6s. 6d

MOUNTED AS ABOVE, 3s. 6d.

Postage, 3d. extra



'Aptus' Rapid View Lenses



Iris Diaphragms.

Meniscus, Working Aperture, F/11. TTT

Size.	Focus.	Diam.	Price.
4¼×3¼ & 5×4 in.	5 in.	1⅝	15/-
6½×4¼ in.	7½ in.	1¾	17/6
8½×6½ in.	10½ in.	1¾	25/0

Acknowledging the excellence of the Lenses manufactured in London, and bein aware of their very high prices, we have been induced, owing to the unprecedented success we have had with our 'Aptus' R. R. and W. A. Lenses, to introduce a few

'APTUS' QUICK-ACTING PORTRAIT LENSES,

Specially adapted for Studio work, and at reasonable prices. These Lenses we thoroughly guarantee as being made of the finest English Glass, and are thoroughly tested before leaving our premises, notwithstanding which we give our customers the privilege of a three days' trial, and should the Lens be found to be unsatisfactory we undertake to return the money.

PORTRAIT LENSES, 'Extra Rapid.' TT

CARTE-DE-VISITE. Largest Aperture, F/3.

1 B.—Diameter of Lens, 1⅛ in.; Focus, 4¼ in.; size covered, 4¼ × 3¼ in. £2 0 0
Distance from subject for full-length Carte-de-Visite, 12 ft.

1 B Leng.—Diam. of Lens, 2⅛ in.; Focus, 4¾ in.; size covered, 4¾ × 3¾ in. 3 0 0
Distance from subject for full-length Carte-de-Visite, 15 ft.

REAL ENGLISH LENSES OF THE HIGHEST POSSIBLE QUALITY.

SPECIAL LENSES MADE TO ORDER.

Wholesale Terms to Dealers.

SHARP & HITCHMOUGH, LIVERPOOL.

Telegrams: 'APTUS FINDER, LIVERPOOL.' Telephone—2495.

CAMERAS.

(MADE IN ENGLAND.)

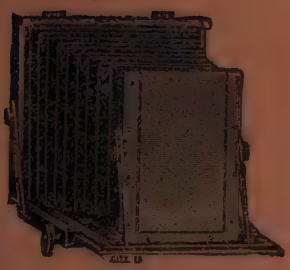
Without Doubt the Best Value ever Offered.

COMPRISING A

New Gresham Camera.

WEIGHT 2 lbs. 6 ozs. *FINEST WORKMANSHIP.*

For Plates 6½ × 4¾. TTF



Modern Construction; Square, with Reversing Back for Vertical and Horizontal Pictures; Leather Bellows; Rack and Patent Pinion Adjustment; Extension Body for Copying, &c.; one Double Slide, book form ... ... Price £ 3 0 0

Extra Slides, **15s.** each.

'APTUS' APLANATIC LENS.

For Landscapes, Groups, Portraits, Architecture, Copying, and Instantaneous Work, Half-plate Iris Diaph. ... Price 1 5 0

'APTUS' PORTABLE TRIPOD STAND ... ... Price 0 10 0

£4 15 0

THORNTON SHUTTER £0 10 0

SOLID LEATHER CASE 0 15 0

CHEAP AND UNRELIABLE GOODS WE DO NOT STOCK.

Will Correspondents please address all Indents to—

SHARP & HITCHMOUGH, 101 & 103 DALE ST., LIVERPOOL.

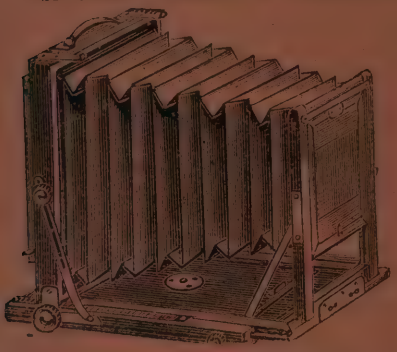
ROYALTY!

THE 'PRINCESS MAY' CAMERA

1898.

(MADE IN ENGLAND.)

SPECIALLY DESIGNED & CONSTRUCTED FOR THE USE OF LADIES.



EXCEPTIONALLY light (turning the **scale at 2½ lbs.**) and strong, extremely portable, having every possible movement, and all the advantages that are possible to embody in a modern Camera. In addition to possessing all the latest improvements up to the season of 1897, we now fit our New Double Pinion Movement, which has turned out an undoubted success.

The additional improvement provides a means for fine adjustment of the body when used for copying and reducing, and is thereby specially adapted for Lantern Slide making. The apparatus is made of selected figured mahogany and well seasoned.

The brass work is highly finished, imparting great beauty to the Camera. It is our desire to make a leading feature of the above for the coming season, and with this object we have decided that FANCY PRICES shall not stand in our light.

Our desire is always to give the best possible value. Being manufacturers of our specialities, we are in a position to supply direct to purchasers, Photographic Cabinet and Brass Work first hand, thus saving all intermediate profits.

PRICES.

	TTF
½ 'Princess May' Camera, three best slides	£5 7 6
Recessed revolving turntable, Royalty paid...	0 10 0
New three-fold tripod, highly finished and French polished, very light, 24 inches when folded	1 0 0
	£6 17 6
½ 'Princess May' Camera as above	8 0 0
Tripod and turntable	2 0 0
	£10 0 0

BADENWEILER, *July 7th*, 1896.

'Outfit splendidly finished, and works to a T.'—H. L. H.

SHARP & HITCHMOUGH, Photographic Instrument Makers,

101 & 103 DALE STREET, LIVERPOOL.

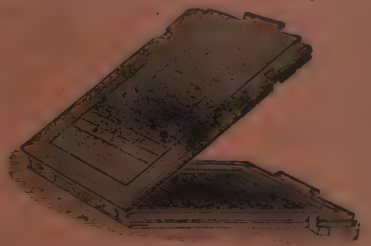
Telegraphic Address: 'APTUS FINDER,' Liverpool.

'APTUS' MAHOGANY DOUBLE DARK SLIDES,

BOOK-FORM,
HINGED SHUTTERS.

			TT
½-plate ...	To fit Lancaster's Instantograph	each	5/3
5×4		,,	7/-
¼-plate ...		,,	9/-
¼ ,, ...		,,	14/-
½ ,, ...	To fit any Ordinary Camera	,,	6/6
5×4		,,	8/6
¼-plate ..		,,	10/6
¼ ,, ...		,,	15/6

Postage extra.



PORTABLE 'APTUS' LANTERN COPYING CAMERA,

FOR REDUCTION. (Adjustable Focus.)

Including Double Slide for Plates, 3¼×3¼, and 4¼×3¼.

To copy from	Price in Mahogany.
¼, 5×4, and ½	40/-
10×8 and down to ¼ plate	45/-

Stereoscopic, 45/- Rack-and-Pinion Adjustment to any of above, 10/6 extra.
Fitted with Lens complete, 10/6 and 21/- extra.

From **25/-**



MADE IN ENGLAND.

New 'Aptus' Stereoscopic Camera.

First quality. All modern improvements.

To take plates 6½×4½ or 6½×4¼. Price, with three Double Slides, **£7 10s.**

Pair Selected **Stereo Lenses, £2 2s. Stereoscopes** (American pattern), **3s. 6d. Stereoscopic Achromatic Eye Pieces,** Rack Adjustment, **12s. 6d., 15s.** to **30s. Revolving Stereoscopes,** to hold 50 and 100 Slides, from **42s.**

Stereoscopic Printing Frames, so constructed that it is unnecessary, when printing transparencies, to cut the negatives. In pine, price **4s. 6d.** each. Ordinary **Stereo Printing Frames, 2s.** each. **Stereoscopic Mats,** assorted shapes, **1s.** per box. **Stereoscopic Obscured Cover Glasses,** very thin, **4s.** per dozen.

Dark Slides, New Fronts, and Repairs, &c., promptly made by our own Workmen, in Wood or Metal.

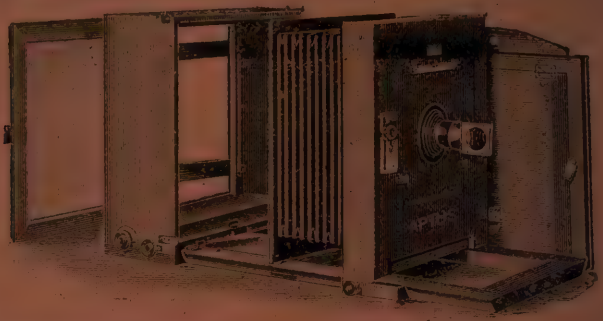
Mechanical Contrivances of any description made to Drawings. Repairs in Photographic, Scientific and Optical Branches a Specialty.

SHARP & HITCHMOUGH, LIVERPOOL.

You will find on Page 1268 a Sample of our Washable Backgrounds.

'APTUS' PROCESS CAMERA.

TT



Adjustable Screen Holder. *Latest Construction.*

10 x 8, £6 10s. 12 x 10, £7 5s. 15 x 12, £8 15s. 18 x 16, £12 10s

TTF

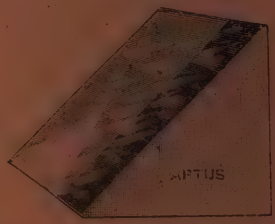
PRISMS

(Silvered).

1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.
12/-6	17/-	22/-	30/-	40/-	62/-

Mounting specially to suit own Lens extra—

21/-, 25/-, 27/6, 30/-, 35/-, 40/-.





REVERSING MIRRORS, 7 × 4 ins., 7/6 each,
RESILVERING MIRRORS, 5/- each.
MIRROR BOXES, with extra front for Lens, 17/6 each.

LEAD-LINED WOODEN SINKS. TT



20 x 15 x 3½	... £0 11 6
24 x 17 x 3½	... 15 6
30 x 19 x 4	... 18 6
36 x 25 x 5	... 1 5 0

Zinc and Copper for Etching.

SHARP & HITCHMOUGH, Liverpool.

SHARP & HITCHMOUGH'S
'APTUS' UNIVERSAL HAND CAMERA.

The first and only Camera designed for Hand and Tripod work. This is not a recent production, but is a well tried piece of apparatus. All



Mr. Paul Lange's prize pictures of NORWAY and ICELAND were taken with a similar Camera made by us to his order.



International Exhibition, 1888, Prize Medal for Excellence of Apparatus.

Are in use in The British Isles, France, Spain, Portugal, Germany, Russia, Austria, Italy, Turkey, Greece, Switzerland, Iceland, Norway, Sweden, Holland, Belgium, Malta, Gibraltar, and in fact, all parts of the World.

—o—

A Camera adapting itself to all manner of work, and may be used in or out of the case as desired.

Prices on following page.

Made in England.

'FERN BANK, ROEHAMPTON PARK, SURREY, S.W., *April 18th*, 1892.

'DEAR SIRS,—I am very much pleased with my Camera indeed.

'Yours truly, N. H. PEECH.

'Messrs. SHARP & HITCHMOUGH.'

'1 CREED LANE, LUDGATE HILL, LONDON, E.C., *July 20th*, 1892.

'DEAR SIRS,—A personal friend of the head of our firm has just come over from Australia, and wants a Hand Camera. I have suggested yours as being the most suited to his requirements, which, I need not say, are, as usual, "Universal."

'Yours truly, THE EDITOR, *Amateur Photographer*.

'Messrs. SHARP & HITCHMOUGH.'

W. W. BYINGTON, Esq., writes— 'ALBANY, N.Y., *Sept. 25th*, 1893.

'I like the Camera which you so kindly made for me very much, and everyone is extremely pleased with it. I need more dark slides; will you kindly provide me with dark slides to carry six more plates.'

SHARP & HITCHMOUGH,

DESIGNERS, PATENTEES, AND MANUFACTURERS, LIVERPOOL.

SHARP & HITCHMOUGH'S
'APTUS' UNIVERSAL HAND CAMERA MINOR.
MADE IN ENGLAND.

SPECIFICATION FOR ¼-PLATE.

'APTUS' UNIVERSAL HAND CAMERA, 10½-in. Extension Patent Rack adjustment, rising and falling front, swing back, square for vertical and horizontal pictures, three double dark slides, focussing screen, and all necessary Attachments.

Quarter-plate size, without case	£4	10	0
Walnut Case Finder, &c.	1	5	6
Thornton-Pickard Instantaneous Shutter	0	12	6
Swift's Detective Lens, 5 or 5½ in. Focus	2	5	0 TT
Iris diaphragm, 15/- extra.	£8	13	0

Cash with Order Ten Per Cent. Extras if required.

Slides, **12/6** each; Extra Long Extension, Swing front, Focussing Indicator, **25/-**; Automatic cut-off to Lens and Finder, **12/6**; Recessed Revolving Turntable and Patent Royalty, **12/-**; Magazine Changing Boxes for 12 plates or films in sheaths and fitting, **33/-**; Speed Indicator to Shutter, **3/6**; Time arrangement to Shutter, **7/6**; Safety Blind to Shutter, **5/6**; Spring Box to hold the Slide and Focus Frame always in position, **17/6**; Waterproof Cover for Case, **8/6.**

SPECIFICATION for 5×4, same as above.

5×4 'Aptus' Universal Hand Camera Minor, 12in. Extension	£5	5	0
Walnut Case, Finder, &c.	1	15	0 TT
Thornton-Pickard Instantaneous Shutter	0	15	0
Swift's Detective Lens, 6 in. Focus	2	10	0
Iris diaphragm, 15/- extra.	£10	5	0

Cash with Order Ten Per Cent. Extras if required.

Slides, **15/-** each; Extra Long Extension, Swing front and Focussing Indicator, **30/-**; Recessed Revolving Turntable and Patent Royalty, **13/6**; Magazine Changing Box for 12 plates or films in sheaths and fitting, **35/-**; Spring Box for the Slide and Focus Frame, always in position, **20/-**; Waterproof Cover for Case, **9/6.**

The Editor of PHOTOGRAPHY writes:—'In our opinion this Camera is a very clever thing, and one with which not only the best, but also all varieties of work can be done. It will certainly meet with approbation at the hands of the man who wants a good article.'

See Extracts from Letters received on previous Page.

SHARP & HITCHMOUGH,
Inventors, Patentees, and Manufacturers,
101 & 103 DALE STREET, LIVERPOOL.

TTF

'APTUS' GUINEA MAGAZINE HAND CAMERA,

For 6 ¼-PLATES or 12 ¼-FILMS IN SHEATHS.



Achromatic Lens Working with Large Aperture.

Handsomely Covered

Two Finders, for Vertical and Horizontal.

Six Sheaths for Films or Plates.

Time and Instantaneous Shutter.

Weight, 1lb. 6 ozs.

Size, $7\frac{3}{4} \times 5\frac{3}{4} \times 5$ in.

Before purchasing ask your Dealer for the **'APTUS' MAGAZINE CAMERA**, and see that you get it.

SHARP & HITCHMOUGH are the only makers.

THIS ILLUSTRATION represents the same

GUINEA CAMERA,

but fitted with DOUBLE DARK SLIDE of superior make. The size of Camera is $7\frac{1}{4} \times 5\frac{1}{4} \times 4\frac{1}{4}$ in., and weight, with Slide complete, $1\frac{1}{4}$ lbs.



Extra Slides, 4s. each. Weight under 3 oz. each.

Postage on either of the above, $7\frac{1}{2}d.$

Foreign Indents should in all cases be addressed to—

SHARP & HITCHMOUGH, Liverpool.

SHARP & HITCHMOUGH'S
'APTUS'
Magazine Hand Camera.

PATENT.

SHARP CAMERA. QUICK LENS. SWIFT SHUTTER.

So Simple and yet so Perfect.

MARVELLOUS VALUE. BEST WORKMANSHIP.
FINISHED APPEARANCE.

MAGAZINE for 12 PLATES or 24 FILMS in SHEATHS



Jena Glass Achromatic Lens.
Iris Diaphragms.
Working at Very Large Aperture
Case handsomely covered, with Stitched Handle.
Automatic Counting Indicator.
Two Finders for Vertical and Horizontal Pictures.
12 Quarter Sheaths for Films or Plates with Each Camera.
Time and Instantaneous TTF Shutter, with Speed Adjustment, weight 2¼ pounds.
Size only 8 × 5¾ × 5 inches.

Price only **30s.** complete. The above for 5 × 4 Plates or Films, **40s.**

EXTRAS.

The following may be added at the prices named below:—

1. Sheaths for plates or Films, ¼-plate, **4s. 6d.** per dozen; 5 × 4, 5s. 6d. per dozen.
2. Case covered in Morocco Leather and best Stitched Handle, ¼-plate, **10s.** 5 × 4, 12s. 6d. each.
3. Achromatic R.R. Lens, Iris Diaphragms, ½, **21s** each.
4. Clamp to secure Plates, **2s. 6d.**
5. Focussing Adjustment by Rack and Pinion, with outside Indicator showing the various distances, ½, **15s.**; 5 × 4, **17s. 6d.**

Nice Waterproof Cloth Case with Strap, &c., for carrying above ¼-plate, **5s.**; 5 × 4, **6s. 6d.** each.

Thornton Pickard Snap Shot or other of their make may be fitted if desired.

If you have not yet been successful with a Hand Camera, try the **'APTUS' MAGAZINE.** Acknowledged by all to be the Cheapest and best Camera ever produced for the money.

To be obtained from any Dealer at Home or Abroad, or from the Sole Makers—

SHARP & HITCHMOUGH, LIVERPOOL.

'APTUS' MAGAZINE HAND CAMERAS.

TAKE THE LEAD IN POINT OF QUALITY.

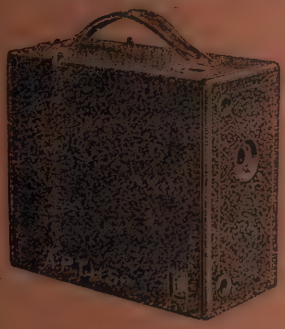
The SUCCESS of '96-7.

Iris Diaphragms fitted without extra charge.

Our New Pattern TTF

IS THE CYCLIST,

Portable enough to carry on a 'Bike.' It only measures 8 × 6¾ × 4, and weighs 2 lbs. 2 oz., and carries twelve quarter-plates, or twenty-four quarter-films in Sheaths. It is fitted up in the same excellent manner as our now **Celebrated 'Aptus' 30/- Magazine Hand Camera.** For details, see previous page.



The Price, Complete, with 12 Sheaths for Films or Plates, is— 30/=

May be had in 5 × 4 Size at 40/-

Each Camera properly examined before leaving our Premises.

Our 'Aptus' Detective R.R. Lenses, Iris Diaphragms, may be fitted at the following extra Charges:—

Quarter-plate, 6 in. focus ...	£1 1 0
5×4, 7 in. focus	1 5 0

The 'Aptus' 30/- Magazine Cameras are in use in all quarters of the Globe. Ask your Dealer to show you one.

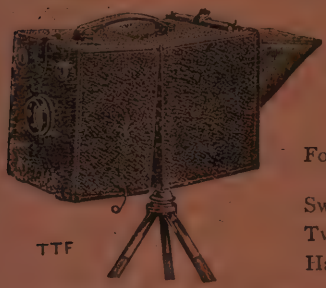
WE ARE THE MAKERS—

SHARP & HITCHMOUGH, Liverpool.

'APTUS' HAND CAMERAS.

THE 'MERSEY.'

Designed for HAND or STAND, or use when CYCLING.



TTF

Size of Camera, $7\frac{3}{4} \times 5\frac{1}{2} \times 4\frac{1}{4}$.

Weight (1 Slide), 2 lbs. Two extra Slides, $5\frac{1}{2}$ oz.

'APTUS' DETECTIVE R.R. LENS, F/8, Iris Diaphragms.

Focussing Adjustment by Rack-and-Pinion, Ground Glass always in position.

Swing Back. Thornton-Pickard Shutter.

Two Finders for Vertical and Horizontal.

Handsomely Covered and Stitched Handle.

Price complete, with three Slides, **£4 4s. 0d.**

The whole in very neat Waterproof Sling Case.

If you have not yet been successful with a Hand Camera

TRY AN 'APTUS.'

STEREOSCOPIC Magazine CAMERA.



Price.

For Films or Plates. **60/=**

Size. $8\frac{1}{4} \times 7\frac{1}{2} \times 6$. Weight, 31lbs. 10oz.

On the same Correct Principle as OUR CELEBRATED 30s. CAMERA.

MADE IN ENGLAND BY

SHARP & HITCHMOUGH, LIVERPOOL.

SOLID LEATHER CASE

FOR

EASTMAN'S POCKET KODAK,



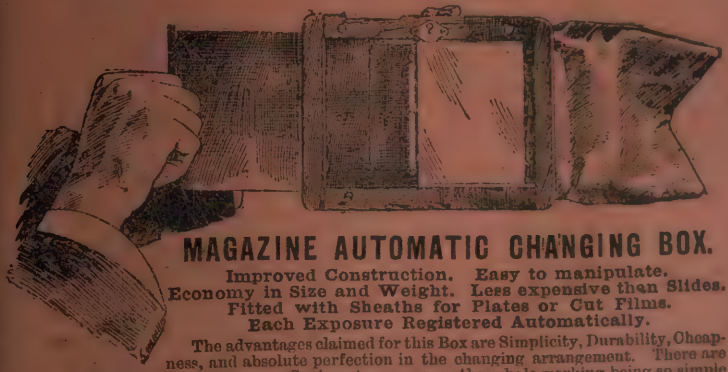
With divisions for 3 extra Spools, and Straps to attach to Bicycle,

In Black or Tan Leather.

Nickel-plated Buckles, and spring Snap.

3/- each, postage 3d. extra.

TTT



MAGAZINE AUTOMATIC CHANGING BOX.

Improved Construction. Easy to manipulate. Economy in Size and Weight. Less expensive than Slides. Fitted with Sheaths for Plates or Cut Films. Each Exposure Registered Automatically.

The advantages claimed for this Box are Simplicity, Durability, Cheapness, and absolute perfection in the changing arrangement. There are no Mechanical Appliances or Springs to go wrong, the whole working being so simple as to preclude the possibility of a Plate sticking when the Box is in use, the Plate being held in perfect register during exposure. The ½-plate sizes carry Eight Plates in Metal Sheaths, with an Improved Indicator for showing the number of Plates exposed. The Box occupies only half the space of four ordinary double Dark Slides, carries the same number of Plates, and is half the weight; while doing all the work of four Slides, it is only one-fourth the cost. Actual outside size of ½-plate Box, 8×6 in.

PRICE COMPLETE, WITH SHEATHS FOR PLATES TF

½-plate, 21/6; to carry 8 Plates. 5×4 Plate, 21/6; ¼-plate, 18/6; to carry 12 Plates

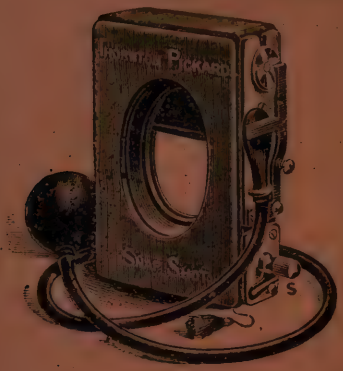
FITTING TO CUSTOMER'S OWN CAMERA, from 2s. 6d. each.

Extra Sheaths can be supplied for carrying Cut Films. Prices on application.

This is believed to be the most Perfect and Cheapest Changing Box in the Market.

SHARP & HITCHMOUGH, LIVERPOOL.

THE THORNTON-PICKARD



NEW
'SNAP SHOT'
SHUTTER.

For ALL KINDS of INSTANTANEOUS SUBJECTS.

IT IS THE SIMPLEST.

IT IS THE CHEAPEST AND MOST EFFICIENT.

IT IS WELL MADE AND BEAUTIFULLY FINISHED.

PRICES. TTT

To fit a Lens Hood or Tube up to inches diameter 1½ 2 2½
Complete with Pneumatic Release 10/- 12/- 15/-
Speed Indicator 3/6 extra.

SAFETY BLIND.

Patent Safety Blind fitted to either the 'TIME AND INST.' (Standard Pattern) or the 'SNAP SHOT' Shutter up to 2½ in. size, 5/-

THORNTON-PICKARD TIME & INSTANTANEOUS SHUTTERS.



TIME AND INSTANTANEOUS
(*Ordinary Standard Pattern*). TTT

For 'Time' and 'Instantaneous'

Inches	1½	2	2½	dia.
	18/6	20/6	23/6	
Inches	3	3½	4	4½	5 ,,
	27/6	32/6	37/6	42/6	47/6

When ordering please send a narrow strip of paper, just long enough to meet round the Lens Hood or Tube. Whenever possible we prefer to have the Hood itself to be fitted accurately.

IMPORTANT NOTICE.

We are often asked by Amateur and Professional Photographers which pattern Shutter is the best.

We may say that for general all-round work we always recommend the **Time and Instantaneous Shutter Standard Pattern**, as described above.

The Foreground, Extra Rapid, Stereoscopic, and other patterns, are for special kinds of work.

Long Tubing for Self-portraiture, 5d. per foot; Large Ball for do., with Stopcock, including Teat and Cementing up of Joints, &c., 4/-

TRADE TERMS FROM

SHARP & HITCHMOUGH, 101¼ & 103 Dale St., Liverpool.

THORNTON-PICKARD

'FOCAL PLANE' SHUTTER



EXTRAORDINARY RAPIDITY!

(Speed 1-20th to 1-1000).

REMARKABLE RESULTS!

PRICES OF FOCAL PLANE SHUTTER (Includes fitting to Camera).

Inches.	£ s. d.	Inches	£ s. d.
4¼ × 3¼ (¼-plate)	1 15 0	7½ × 5	2 12 6
5 × 4	2 0 0	8½ × 6½ (whole plate)	3 0 0
6½ × 4¼ (⅓-plate)	2 5 0		

Speed Indicator (strongly recommended) 3/6 extra.

TTT

NEW SPEED INDICATOR.



VERY SIMPLE. DOES NOT RETARD THE SPEED OF THE SHUTTER.

SHOWS AT A GLANCE AT WHAT SPEED THE SHUTTER IS SET.

This can be fitted to any of the Shutters described, price 3/6, or fitted to Shutters previously supplied without it, price 5/-.

When ordering Shutters please state if it is required.

The THORNTON-PICKARD Patent

RUBBER MOULDING

FOR FITTING SHUTTERS TO LENSES,

TTT

And for

ADAPTING ONE SHUTTER to TWO or more LENSES.

THE MOULDING

Is made of the thicknesses shown.

PRICE 8d. per Foot.



	1	2	3	4	5	6	7
	1/16"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"



TIME and INSTANTANEOUS SHUTTER.

TT

Quarter-plate ... ... 3 -

Half-plate 4 6

POSTAGE, 2d.

'APTUS'
CAMERA STANDS.



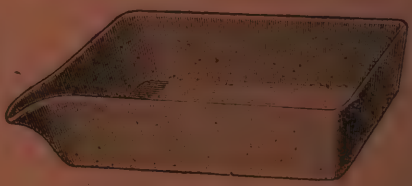
ASHFORD'S PATENT, &c.

Two-fold, cheap quality **4/6** each.
„ Ash ... ... **6/6** „
„ „ superior **8/6** „
Three „ ... **10/6** & **12/6** „
Three-fold, Ash, patent snap joint ... **18/9** „
Four-fold, Ash ... **15/9** & **18/6** „
Cycle Tripod, very light, **10/6** „

GRANITINE DISHES TF

(ENGLISH MAKE).

Shallow.		Deep.	
¼	-/7	¼	-/8
5×4	-/8	5×4	-/9
½	-/10	½	1/-
1	1/2	1	1/6
10×8	1/4	10×8	1/8
12×10	1/9	12×10	2/6
16×12	4/10	16×12	6/-



WOODEN TRAYS, with Glass Bottoms, for Bromide Work.

13×11	4/6	16×13	5/6	18½×15½	7/6	24½×18½	10/-
TTF		27×23	12/6	31×23	15/-	33×28	18/6

SHARP & HITCHMOUGH, LIVERPOOL.

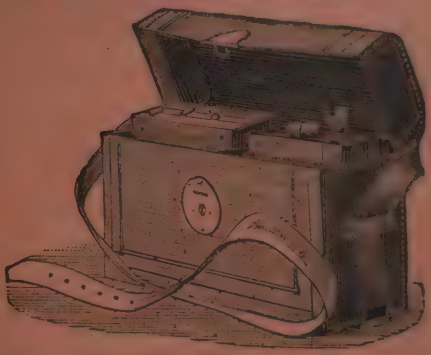
Manufacturers of Photographic Specialities.

CAMERA CASES.

LEATHER CASES

These are made out of the best hide, lined, partitions to carry Camera, Lens, three Slides, &c. Lock and Key, Hand and Shoulder Strap.

¼	½	¼	10×8
12/6	15/-	20/-	30/-
	12×10 ...	37/-	



LEATHER CASE. TT



WATERPROOF CANVAS CASES

as above, ¼, 9/- TT

½... ... 12/-	¼ ... 15/-
10×8 ... 18/-	12×10... 20/-

Lock and Key, 2/6 extra.

Other Sizes made to Order.

COLLAPSIBLE CANVAS CASES

(Waterproof). TTT

¼ 3/9	½ 5/3
¼ 6/9	

To hold Camera, three Slides, Lens, &c.

EBONITE DEVELOPING TRAYS, Best Quality. TTF

4¼×3¼ and 3¼×3¼ ... 6/8 doz. ... 7d. each	9 × 7 ... ...19/4 ,, ... 1/8 each
5½×4¼ ... ... 7/4 ,, ... 8d. ,,	11¼× 9¼, 1 in. deep 33/9 doz. ... 3/- ,,
7 ×5¼ ... ... 9/1 ,, ...10d. ,,	12⅜×10¼, 1¼ in. ,, 58/- ,, ... 4/6 ,,

CELLULOID TRAYS.

Unbreakable. TTF

VARIOUS COLOURS.

4¼×3¼ ... ... 5/8 doz. ... 7d. each
5½×4¼ ... ... 6/4 ,, ... 9d. ,,
7 × 5 ... ... 9/- ,, ... 1/- ,,
9 × 7 ... ... 13/- ,, ... 1/4 ,,
10× 8 ... ... 16/8 ,, ... 1/6 ,,
12×10 ... ... 46/8 ,, ... 4/- ,,



SHARP & HITCHMOUGH, LIVERPOOL.

DEAL PLATE BOXES FOR NEGATIVES.

BEST QUALITY ONLY. TTT

EACH GROOVE NUMBERED.

Size.	For 12 per doz.	For 12 each.	For 24 per doz.	For 24 each.	For 50 per doz.	For 50 each.
4¼ × 3¼	12/-	1/2	14/-	1/4	18/-	1/9
5 × 4	13/3	1/3	15/-	1/7	21/-	2/-
6½ × 4¼	19/-	1/8	22/-	2/-	27/-	2/6
8½ × 6½	24/-	2/2	30/-	2/9	36/-	3/3
10 × 8	35/-	3/3	45/-	4/-	54/-	4/9
12 × 10	45/-	4/-	54/-	4/9	72/-	6/6

XYLONITE FORCEPS. TTT

Small	1/6 doz.	2d. each.
Large	3/- „	4d. „
Thimble Plate Lifters	1/6 „	2d. „

One dozen assorted on Show Card ... 2/3.



LIGHT-TIGHT BOXES, for Dry Plates.

For the Systematic Storage of Negatives.

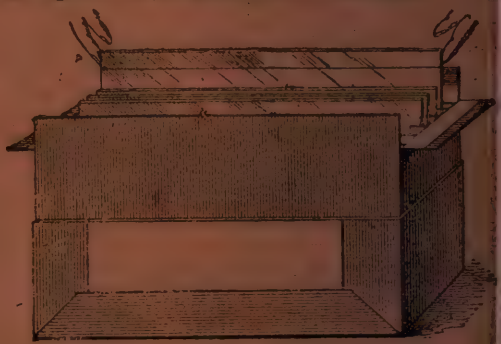
FITTED WITH PAPER-COVERED METALLIC GROOVING, occupying smallest possible space. The Plates can be stored close together, and yet sufficient space to avoid contact.

TTF

PRICES.

12 grooves, for 12 plts.
2½ inside measure.
Cloth, covered.

Size.	doz.	each
4¼ × 3¼	5/2	-/6
5 × 4	6/-	-/7
6½ × 4¼	6/8	-/8
7¼ × 5	7/-	-/9
8½ × 6½	9/2	-/10
10 × 8	11/6	1/1
12 × 10	16/-	1/6



POCKET CASES FOR MICROSCOPIC SLIDES.

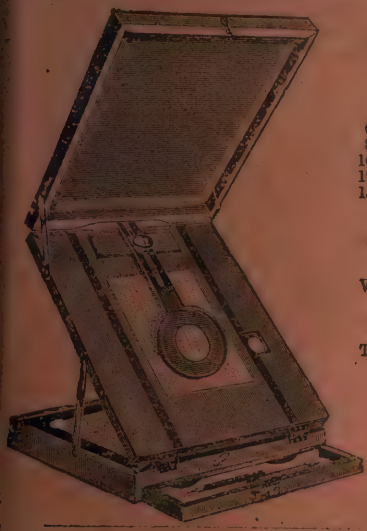
To hold 6	6/3 per doz.	7d. each	TTF
„ 12	10/- „	1/- „	

BOXES FOR MICRO. SLIDES. TTF

To hold 6	53/- per gross.	4/8 per doz.	5d. each
„ 12	64/- „	5/6 „	6d. „
„ 24	86/- „	7/6 „	8d. „

'APTUS' SPECIALITIES

obtainable from all Wholesale Houses.



'APTUS'
RETOUCHING DESKS.

From 4/6 each.

10×8 AND ABOVE, WITH DRAWER.

6½ × 4½	7/6	Mahogany	... Tr
8½ × 6½	10/6	,,	...
10 × 8	15/-	,,	...
12 ×10	18/-	,,	...
15 ×12	21/-	,,	...

A New Retouching Desk.

For the Professional Photographer.

Very handsomely made in Walnut and Mahogany. TT

Prices:—½, 31/6. 10×8, 42/- 12×10, 63/-

The negative is held under the spring disc in any desired position, and all light being blocked out except that passing through the portion being worked, a tinter is provided to ascertain the colour and density of pigment before applying to negative. It is pronounced the most perfect common sense Retouching Desk made.



NEW 'APTUS' OUR PRINTING FRAME.

¼-plate	... 5/- per doz.	...	6d. each TTT
5 × 4	... 7/- ,,	...	8d. ,,
½-plate	... 8/- ,,	...	9d. ,,
½- ,, ...	... 13/- ,,	...	1/3 ,,

PRINTING FRAMES.

10×8	12×10	15×12	
Each 2/3	Each 2/8	Each 4/-	
Doz. 24/-	Doz. 30/-	Doz. 44/-	TTT

DEEP PRINTING FRAMES WITH PLATE GLASS. Tr

12×10, 16/-; 15×12, 21/6; 23×17, 30/-; 28×20, 45/-; 32×24, 55/-; 42×29, 90/-; 54×33, 150/- each.



'APTUS' PINS. TTT

For Suspending Enlargements, Prints, and Films while Drying.
Twelve in Box, price 6d.

To be obtained from all Dealers, or from

SHARP & HITCHMOUGH,
LIVERPOOL.

MADE IN ENGLAND.

THE 'Mersey' Washer.



	Each.	Doz.
¼ and 5×4	5/6	63/-
½-plate ...	7/6	81/-
1 ,, ...	10/6	105/-

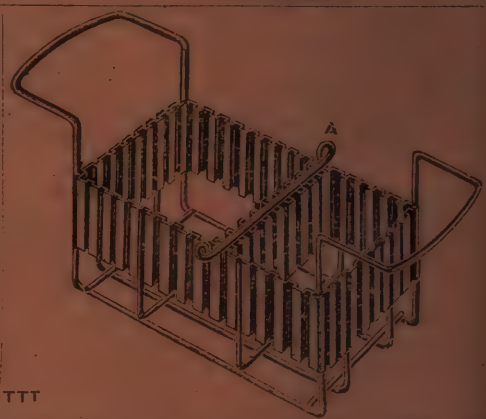
Zinc bottoms, -/8, -/10, 1/- each extra. Packing extra.

TTT

The Adjustable Rack.

Rack for same	4/- each.
,, ...	6/- ,,
,, ...	8/- ,,

A is a movable division, which by means of a tension screw at either side can be used for any size plate.



TTT

'APTUS' PLATE RACKS. TTT

¼-plate ... 1/- each. ... 10/- dozen. ... 90/- gross.
½ ,, ... 1/3 ,, ... 12/- ,, ... 105/- ,,
1 ,, ... 1/6 ,, ... 16/- ,, ... 120/- ,,





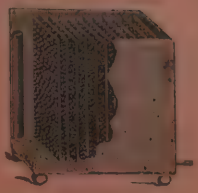
'APTUS' TANKS, with Syphons, for above.

¼-plate ... 1/3 each. ... 12/- dozen. ... 105/- gross.
½ ,, ... 1/6 ,, ... 16/- ,, ... 120/- ,,
1 ,, ... 1/9 ,, ... 20/- ,, ... 135/- ,,

SHARP & HITCHMOUGH, LIVERPOOL.

'APTUS' FILM WASHERS

SPECIALLY CONSTRUCTED.



	For Twelve Films. TTT
¼ and 5×4	6/6 each
½-plate	10/6 ,,

FOCUSSING CLOTHS.

Entirely supersedes the Ordinary Focussing Cloth.



It consists of a conical light-tight hood, the large end of which fits on the back of the camera by an elastic band, and the small end is fitted with a leather eye-piece which fastens by elastic loops round the ears of the operator.

Advantages.—Perfect exclusion of light, thereby securing a brilliant image on the screen and greatly facilitating fine focussing. No need to remove the hat. The wind has little or no effect upon it. Both hands are free. Extremely simple and quickly adjusted.

PRICES: TTF

In Silcot Lined ... ... ¼-plate size, 2/6; ½-plate, 3/-; ¼-plate, 4/-.
In superior Velveteen (fast pile) Lined, ¼-plate, 4/-; ½-plate, 5/-; ¼-plate, 6/6.

PLAIN CLOTHS.

Rubber Cloth, 36×30, 2/6. Ditto, Velvet Cloth, 36×30, 7/6.

Focussing Cloths and Changing-Bags Combined.

¼, 5/- ... ½, 7/6 ... 1, 10/6 each. TTF

Ivory Name Plates for Dealers.

Quotations on Application.

SMITH'S
Photo Stores,
MERSEYPOOL.

3 doz. from 3/- doz.
6 ,, ,, 2/3 ,,
12 ,, ,, 1/9

'APTUS' RUBY AND CANARY FABRIC.

FOR DARK-ROOM WINDOWS, 1/- per yard. TTT

Per Roll of 38 Yards, 29s.

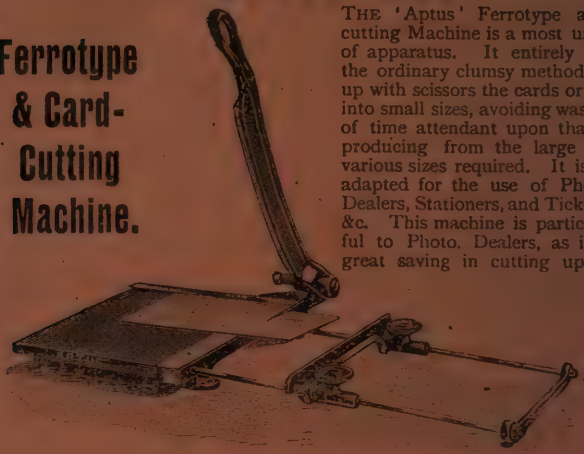
Masks and Discs, C.D.V. and Cabinet, Assorted in Boxes, 1s.

SHARP & HITCHMOUGH, Government Contractors,

101 & 103, DALE STREET, LIVERPOOL.

Telephone No.—2495. Telegrams—'Aptus Finder,' Liverpool.

SHARP & HITCHMOUGH'S
'APTUS' NEW
Ferrotype & Card-Cutting Machine.



THE 'Aptus' Ferrotype and Card-cutting Machine is a most useful piece of apparatus. It entirely supersedes the ordinary clumsy method of cutting up with scissors the cards or ferrotypes into small sizes, avoiding waste and loss of time attendant upon that mode of producing from the large plates the various sizes required. It is also well adapted for the use of Photographic Dealers, Stationers, and Ticket Writers, &c. This machine is particularly useful to Photo. Dealers, as it effects a great saving in cutting up sensitised paper into sizes, with cleanly trimmed edges ready for printing and mounting. To those small dealers who have not a ready sale for sensitised paper in packets, it will enable them to always supply packets of cut up paper in a perfect condition. The machine is very simple in manipulation, and not likely to get out of order. It can be applied to a multiplicity of purposes, and is as useful in the counting-house as in the photographic studio. They are now largely used by our leading Cardboard Makers, Sensitised Paper Manufacturers, &c. The machine is small, light, and inexpensive. TT

Price ... ... 31/6. Case extra ... ... 1/3.



'APTUS' BYE-PASS GAS BURNERS.

This Burner should be used in every dark room. It is attached to any gas bracket the same as an ordinary burner; by shutting the tap the gas is rendered quite invisible but not extinguished, and can at any moment be relit without the use of matches. This Tap is simply invaluable for the rapid printing processes, lantern-slide making, &c.

Price ... ... **2/6.**
Postage ... ... **2d.**

TT

Cheaper quality, **1/6** each. Postage, **2d.**

TTT

Will Dealers please apply for Wholesale Terms to

SHARP & HITCHMOUGH, LIVERPOOL.

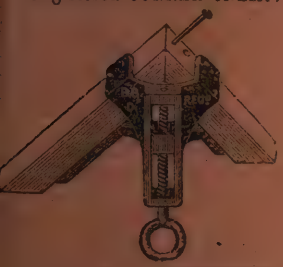
ORIGINAL 'APTUS' ROLLER SQUEEGEE.

Diameter of Roller.	Length.	Price per doz.	Each.
1 inch.	3 inch.	9/-	10d.
1 ,,	4 ,,	12/-	1/2
1 ,,	5 ,,	15/-	1/5
Very strong twisted Handles. TTT			
1¼ inch.	6 inch.	27/-	2/6
1¼ ,,	7 ,,	31/6	2/11
1¼ ,,	8 ,,	36/-	3/4
1½ ,,	9 ,,	40 6	3,9



Polished Handles, Nickelled Ferrules, best make.

Registered CORNER CRAMP.



No. 1.	No. 2.	No. 3.
Will take 1¾ in.	2 in. to 2¾	3in. to 4in. Mouldings
Price 2/-	3/-	5/- per pair.
Postage 3d.	6d.	1/- ,,

The Registered Corner Cramp is intended for gripping securely two sides of a Picture Frame during the process of nailing together.

REGISTERED MITRE-CUTTING MACHINE.



Invaluable to Joiners, Picture-frame Makers and Amateurs.

No. 1.—TO CUT 2-INCH MOULDINGS. TT

Mitre-Cutting Machine ..	15/-
Extra Cutter	4/-
Spanner	9d.
Packing Case	6d.

Weight, complete, 18 lbs.

No. 2.—TO CUT 4-INCH MOULDINGS.

Mitre-Cutting Machine ..	30/-
Extra Cutter	7/-
Spanner	1/-
Packing Case	9d.

Weight, complete, 42 lbs.

This Machine supplies Joiners, Picture-frame Makers, and Amateurs, with a tool which for general utility, handiness, accuracy, and expedition cannot be excelled. It cuts a clean mitre joint with unfailing accuracy, dispensing with the use of the saw and the plane, and also the usual mitre cutting and shooting board. It is the only mitre-cutting machine which will cut ordinary gilt mouldings without injury to the gilt surface or composition. No special skill is required to use it; in fact, with this instrument Picture Frames can be easily made and put together without the aid of a skilled mechanic. TT

Oak Mouldings.



A	P	T	U	S	TTF
1½ in.	1½ in.	1 in.	1½ in.	1½ in.	
12 ft., 2/3	12 ft., 2/3	12 ft., 1/6	12 ft., 2/-	12 ft., 2/3	
100 ,, 15/-	100 ,, 15/-	100 ,, 10/-	100 ,, 14/-	100 ,, 15/-	

DEALERS SHOULD WRITE FOR DISCOUNTS ON OUR SPECIALITIES.

TRIMMING WHEELS. TTT

Will Cut Prints Wet and Dry. 9d. each.



TRIMMING KNIVES.

Best Sheffield.

For Dealers.

One dozen, on nice Card, 9/-; 9d. each. TTT



'APTUS' MOUNTANT.

SPONGE TOP. NO BRUSH REQUIRED.

Always ready for use. 1/- each. TTT

4-oz. Bottles of Mountant, in Metal Screw-Cap Bottles, **6d.**

HIGGINS' PHOTO TTT MOUNTER.

Price **6d.** and **1/-**



MOUNTING BRUSHES

Hog Bristles in Metal Polished Handles, On Cards for Dealers. TTT

	No. 1.	No. 2.	No. 3
Per Dozen...	**3/-**	**3/6**	**4/-**
Each	**3½d.**	**4d.**	**4½d.**

SHARP & HITCHMOUGH, LIVERPOOL.

'APTUS' CAMERA LEVELS.



Nickel and Brass. 1/- each. Flush and Counter-sunk. TTT

'APTUS' RETOUCHING SETS

CONTAIN TTF

Holder for Leads, Case of extra Leads, Retouching Medium, Spotting Medium, Two Spotting Brushes.

Price 2/6. Postage 2d. Cheaper Set at 2/-.

'APTUS' BROMIDE PENCILS.

For working up Enlargements.

In pretty cloth-covered box, with gilt clasp, containing four pencils, three grades in black, and one white. Price **1/6.** TTF

WYNNE'S INFALLIBLE EXPOSURE METER.

(Watch Model.)



Protected by British Patent No. 10,617, May 30, 1893.

New in Principle, Design, and Method of Using.

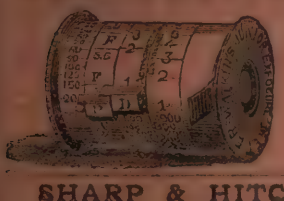
You set the one Scale; it does the rest.

The correct Exposure for every speed of Plate, on every kind of subject, and under every condition of light, shown simultaneously against each of 20 to 30 Diaphragms by simply setting the Actinometer time on Exposure Scale against the Diaphragm No. of the Plate; or, shortly, **you set the one scale, it does the rest.** The two scales are so designed as to each represent three Factors of Exposure. TT

Price, in Handsome Solid Nickel Alloy Cases ... 7/- each.

Important Notice. A New Exposure Meter.

THE 'JUNIOR' WATKINS (Patent).



Simplest. Smallest. Cheapest. Best.

Price of 'The Junior,' with full printed instructions, 7/9; Standard Meter, with full printed instructions, 15/3; with extra divided ring, to facilitate enlarging and copying, 18/3; Exposure Notes (new edition), with ruled lines and much valuable information, 1/7, post free. From all Dealers. TT

SHARP & HITCHMOUGH, LIVERPOOL.



'APTUS' IMPROVED

PLUMB INDICATOR

FOR ATTACHING TO CAMERA.

Cannot get Lost. No Skill required to Fix. TTT

For all subjects in which there are vertical lines, such as Buildings, &c., the Sensitive Plate **must hang plumb,** and it is necessary to have some means of judging when such is the case. This neat device shown is remarkably simple and effective, and shows at a glance when the back is vertical. It consists of a Swinging Pointer attached to a Plate, which may be screwed permanently to the swing back of Camera, and therefore cannot get lost.

Price 6d. each. Postage 1d.

NEW ADJUSTABLE VIGNETTER.

PATENT APPLIED FOR.

The New Adjustable Vignetter can be used with any ordinary printing frame, and in no way interferes with its use when Vignettes are not required. It can be immediately attached or detached, without sticking or pinning, REMAINS SECURE IN ANY POSITION. *A great saving of time to professionals.* Clipped by Aluminium slides, allowing of adjustment up and down or sideways and by means of Metallic grooves the Vignetting card can be placed nearer or farther from negative, and at an angle; or immediately changed for another card of different size opening, producing in a few minutes a Vignetted Print of the greatest excellence. Will Vignette any part of negative desired — For example: Carte-de-visite bust from ¾-length, Cabinet, head and shoulders, from Groups, &c.



—PRICES—

Including Aluminium Slides, and 12 Vignetting Cards (6 with openings of different sizes, and 6 for cutting as desired)—¼-plate, **2/-**; ½-plate, **2/6**; 1-1 plate, **3/6.**

With *superior* Printing Frame and Slides attached, complete in boxes—¼-plate, **2/6**; ½-plate, **3/3**; 1-1 plate, **4/9.**

Extra Cards, plain or cut, **6*d.*** per packet; post free, **7*d.***

Instructions for Use enclosed with each Vignetter. TTF

TTF

ZINC VIGNETTERS.



6 Quarter-plate...	...	2s. 9d.	Each 6d.
3 Half-plate	... ...	2s. 5d.	„ 10d.
3 Whole-plate ...	...	4s. 6d.	„ 1s. 6d.

FULL PARTICULARS FROM

SHARP & HITCHMOUGH, 101 & 103 Dale Street, LIVERPOOL.

'APTUS' PAINTED BACKGROUNDS

MOUNTED ON ROLLERS; TOP AND BOTTOM. TTF

ANY DESIGN PAINTED TO ORDER.

No. 1. No. 2. No. 3.





8×6 feet, **15/-** each ... 8×7 feet, **20/-** each ... 8×8 feet, **25/-** each.

No. 4. No. 5. No. 6.





Other sizes in proportion.

Unlike other backgrounds of this class, 'Aptus' Backgrounds answer a double purpose, as they may be had plain or graduated on the reverse side.

PHOTOS SENT ON APPROVAL.

APTUS' GRASS MATS.

Any size to Order at **5d.** per square foot. TTF

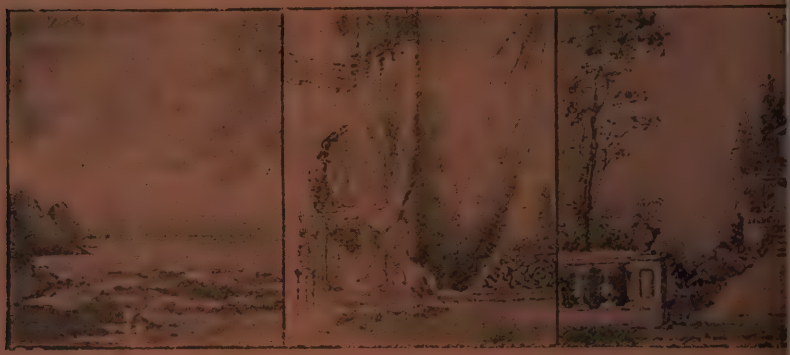
WHOLESALE FROM

SHARP & HITCHMOUGH, LIVERPOOL.

'APTUS' PAINTED BACKGROUNDS.

IF PAINTED IN OIL 6/- EACH EXTRA. TTF

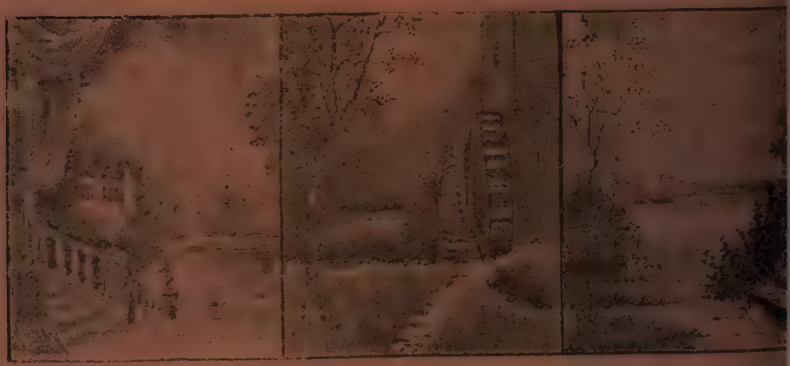
No. 13. No. 14. No. 15.



PRICES.

8 × 6 feet ... **15/-** | 8 × 7 feet ... **20/-** | 8 × 8 feet ... **25/-**

No. 16. No. 17. No. 18.



ELEVATORS—6 feet, 7/6; 8 feet, 8/6.

PAINTED ON 'APTUS' WASHABLE CLOTH.

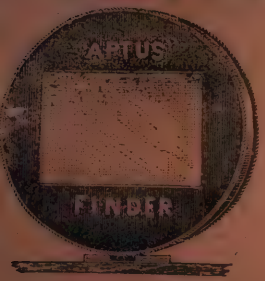
FROM ALL DEALERS. WE ARE THE MAKERS.

SHARP & HITCHMOUGH, LIVERPOOL.

STILL THE BEST.

SHARP & HITCHMOUGH'S 'APTUS' VIEW FINDER.

OVER 63,000 NOW IN USE. 5T



THIS Finder is constructed on an entirely new principle, being simple in use and very convenient in form, as it can be carried in the waistcoat pocket, and s suitable for any kind of Lens.

It certainly possesses many advantages over the old style of finder; the focussing cloth or shade is entirely dispensed with. The reduced reproduction of the object may be seen perfectly well defined in full sunlight—always in focus; adjustment not necessary. For instantaneous work and ascertaining the angle of view, this instrument is without a rival. Thousands of these Finders are now in constant use, in the hands of experienced photographers, and are pronounced perfect. Price 2/6. Flattering testimonials from all parts of the world,

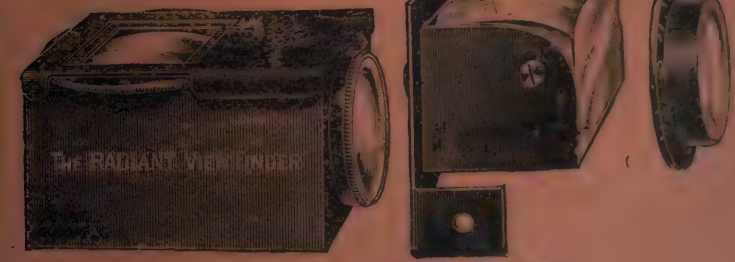
From the AMATEUR PHOTOGRAPHER, March 30th, 1888.—'An ingenious and useful apparatus. The little instrument is beautifully made, and is well worth the price asked for it. We shall certainly make it our constant companion this season.'

To be obtained through all Wholesale Houses.

See that each Finder bears the word 'APTUS,' *our Trade Mark.*

RADIANT VIEW FINDER.

(PATENT.)



No. 1. ACTUAL SIZE. No. 2.

This is undoubtedly the most brilliant Finder yet introduced. It has no mirror or silvered surface to deteriorate, and no ground-glass screen. The Image is TOTALLY reflected.

No. 1 is for use on any Camera, and is fitted with a rotating plate showing both vertical and horizontal views. In the base there are two keyhole slots for fixing to Camera by two round-head screws at top and side placed with centres exactly one inch apart and in a line with the axis of lens.

No. 2 is for insertion in Hand Cameras, one serving for both vertical and horizontal views by simply rotating it through an angle of 90°.

PRICES (including Fixing Screws):

No. 1 ... ... **7/6** | No. 2 ... ... 7/6 TTF

Cheaper quality pattern as No. 1 .. ... . 4/6.

'APTUS' WASHABLE CLOTH BACKGROUNDS

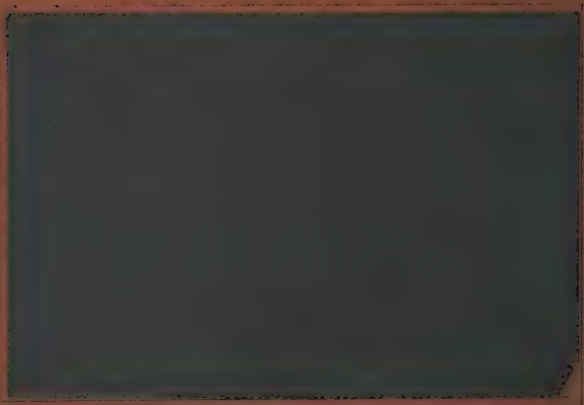
To be obtained through all Wholesale Houses and Dealers in Europe, Asia, Africa, and America,

OR FROM

SHARP & HITCHMOUGH

LIVERPOOL.

VARIOUS COLOURS.



GRADUATED & PLAIN.

'APTUS' PORTABLE ELEVATOR

TTF

FOR BACKGROUNDS.

6 feet... ... 7/6 each. | 8 feet ... ... 8/6.

IN FLATTED OIL, PLAIN AND GRADUATED.

Slate, Blue, Grey, and Cream. Always clean, flat, and free from creases.

Mounted on Rollers top and bottom. Samples on application.

Size.	Same colour two sides. Plain.	2 colours or graduated in distemper.	2 colours or graduated in oils.
50×40	2/6	5/-	5/9
60×40	3/-	5/6	6/3
70×40	3/3	6/-	6/9
70×60	4/9	8/9	9/6
	TTT	TTF	

Size.	Same colour two sides. Plain.	2 colours or graduated in distemper.	2 colours or graduated in oil.
72×72	5/6	9/9	10/9
90×72	6/9	12/-	13/-
96×96	15/-	21/-	23/-
108×72	7/9	14/-	15/-
	TTT		TTF

The graduated series are plain on one side, or may be had plain both sides but of different colours, being so, they answer the purpose of two backgrounds. Samples on application. Will Dealers and Shippers please write for wholesale terms?

THE 'PERFECT.'

Registered No. 227755. TTT



THIS Lamp is of an entirely new design, and is so arranged as to bring the light directly over the work. It has an Orange and Ruby light, which can be used either separately or in conjunction. It is made with a cast taper base to prevent any possibility of upsetting, and is fitted with a wood handle at top, which acts as a non-conductor. It is constructed to burn Paraffin, and gives a brilliantly clear light, burning for over eight hours without refilling. The light is regulated and reservoir filled from the outside. Being well made and nicely finished, forms a very saleable article.

No. 1, 7s.; No. 2, **10s. 6d.** each.



THE 'ACME.'

Patent 3786. TTT

THIS Lamp has Orange and Ruby glasses, one being fixed to prevent any chance of light escaping, but should this one be broken by any means, it can be removed and a new one inserted in a few seconds by undoing the two screws at side, which can be loosened by using a coin, say a penny; the other glass is made to slide. It has also a moveable shutter, which can be placed before either glass, whereby the operator can use either coloured light at will; it also acts as a good reflector. This Lamp burns Paraffin, and possesses similar advantages to the 'Perfect.'

No. 1, 7s.;
No. 2, **10s. 6d.** each.



THE 'TYRO,' for Junior Photographers.

MADE IN THREE SIZES.

No. 1.		No. 2.		No. 3. TTT	
Each.	Per doz.	Each.	Per doz.	Each.	Per doz.
7d.	6s.	9d.	8s.	1s.	10s.
		For Night-lights.			
9d.	8s.	1s.	10s.	1s. 3d.	12s.
		For Oil.			
—	—	—	—	1s. 4d.	14s.

With Self-feeding Candle arrangement.

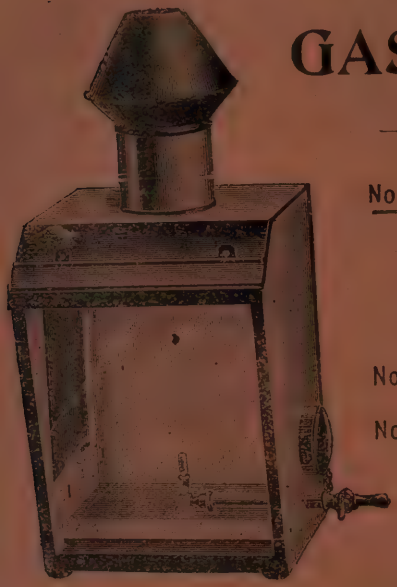
Will Merchants and Shippers please apply for Discounts to—

SHARP & HITCHMOUGH, LIVERPOOL.

TTT

'APTUS' Rock Light GAS LAMPS.

TTT



	s. d.
No. 1. Special Value, $11\frac{1}{2} \times 6\frac{1}{2}$ inches, Ruby Glass and Fabric Screen.....	6/-
No. 2. Ditto, larger size	11 6
No. 3. Extra large, with 10 × 8 Ruby Glass and Fabric in Front and Side Windows	16 6

'APTUS' FOLDING FABRIC LAMP.

TTT

Packs Flat in Case. **1s.** each. Postage 3d.

10s. per dozen.



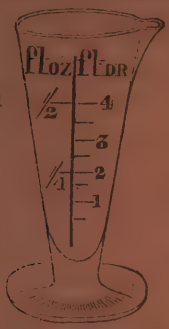
LIGHTS FOR FOLDING LAMPS

2d. each, **1s. 9d.** doz., **20s.** gross. TTT

Will Dealers please apply for Wholesale Terms to

SHARP & HITCHMOUGH, LIVERPOOL.

Fig. 1



GRADUATED GLASSES.

Unstamped.

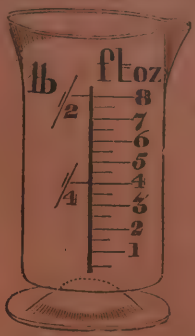
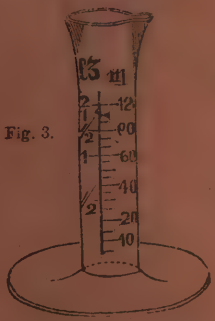


Fig. 2

½oz.	1oz.	2oz.	4oz.	6oz.	8oz.	10oz.	16oz.	20oz.	
5/2	6/4	7/4	10/6	12/-	14/-	15/-	18/6	20/6	per Dozen
6d.	7d.	8d.	1/-	1/2	1/4	1/6	1/10	2/-	each

Fig. 3.

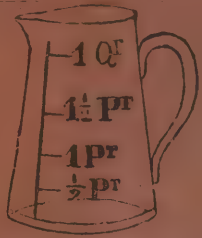


MINIM MEASURES.

Conical or Cylindrical.

Unstamped.

1dr.	2dr.	4dr.	1oz.	
5/2	7/-	11/-	11/6	per Dozen
6d.	8d.	1/-	1/1	each



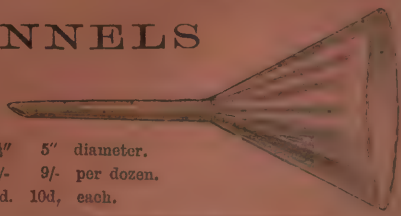
Graduated Glass Jugs

¼pt.	1pt.	1½pt.	1qt.	
15/-	19/-	21/-	25/-	per Doz.
1/4	1/8	1/10	2/3	each

GLASS FUNNELS

(Ribbed).

5T



2″	2½	3″	3½″	4″	4½″	5″	diameter.
3/8	4/4	5/-	5/8	6/-	8/-	9/-	per dozen.
4d.	5d.	6d.	7d.	8d.	9d.	10d,	each.

DROPPING BOTTLES: -/8, 1/-, 1/3 each. TT

PHOTOGRAPHIC GOODS AT WHOLESALE PRICES.

Rain Gauge Jars, Syringes, Shop Rounds, Graduated Medicine Drop Measures, Test Tubes, Thermometers, &c., quoted for.

SHARP & HITCHMOUGH, LIVERPOOL.

COMPRESSED FIBRE FUNNELS.

5 in.	6 in.	7 in.	8 in.	TTT
12/-	14/-	15/-	16/- per dozen.	
1/2	1/3	1/6	1/8 each.	

FILTERING PAPERS (Circular), in packets of 100.

6 in.	8 in.	10 in.	TTF
8/- dozen.	10/8 dozen.	13/4 dozen.	
8d. packet.	11d. packet.	1/2 packet.	

'APTUS' PLATE CLIP. TTTT

For holding the Plate during development, thus preventing the fingers becoming stained by the Chemicals. ½-plate and under, 6d. each; 5/- doz.

'APTUS' CLOUD NEGATIVES.

From Cabinet size to 30×22. PRICES: Cabinet, 1/6 each; Whole-Plate, 2/3 each 10×8, 2/9 each; 12×10, 3/6 each. Postage extra.



PLUSH BLOCKS FOR OPALS

IN BLUE, CRIMSON, and GOLD,

WITH STRUTS. TT

	Each.	Doz.
¼-plate	5d.	4/-
½-plate	8d.	7/6
¼-plate	1/3	13/6
10×8	1/9	18/6

PHOTOGRAPHIC BRUSHES.

TTF

FLAT CAMEL-HAIR DUSTING BRUSHES.

1 in. ... -/3; ..... 2 in. ... -/6; ..... 2½ in. ... -/8; ..... 3 in. ... -/9.
4 in. ... 1/-; ..... 5 in. ... 1/3.

SPOTTING BRUSHES, WOOD HANDLE IN TIN.

2/8 per dozen, 3d. each.

SABLE BRUSHES IN TIN AND WOOD HANDLES.

Nos. 0, 4/-; ... 1, 4/6; ... 2, 5/9; ... 3, 7/6; ... 4, 9/9 per dozen,
/4½ ... -/5 ... -/6 ... -/8 ... -/10 each.

BRUSHES FOR CLEANING DEVELOPING DISHES, &c.

10d. each.

SHARP & HITCHMOUGH, LIVERPOOL.

VIGNETTING GLASSES.

TTF

SIZE.	PEAR, OVAL, AND CUSHION. Per Doz.	Each.
4¼× 3¼	8/-	9d.
6½× 4¾	16/-	1/4
8½× 6½	23/-	2/-
10 × 8	36/-	3/-
12 ×10	48/-	4/-

FOCUSSING GLASS (Finely Ground).

TTT

SIZE.	Each.	Per Doz.	Per Gross.
4¼× 3¼	1½d.	1/4	11/6
5 × 4	2½d.	2/1	21/-
6½× 4¾	3½d.	3/1	32/-
8½× 6½	6d.	5/-	57/-
10 × ■	9d.	7/6	83/-
12× 10	1/6	15/-	150/-

GLASS CUTTING SHAPES.

TTT

	Each.	Per Doz.
Stereo, 3⅜×2⅞	7d.	6/-
C.-D.-V. 3⅜×2½	5d.	4/6
,, 3⅜×2⅜	6d.	5/-
½-plate, 3¼×2¾	7d.	6/-
,, 4 ×3	7d.	6/-
5×4, 4½×3¾	8d.	7/4
Cabinet, 5½×3½	9d.	8/6
Cabinet, 5½ × 4	9d.	8 6
½-plate, 6 ×4½	10d.	9/-
,, 6½×4½	1/-	10 6
7½×5, 7 ×4½	1/4	11/-
¼-plate, 8 ×6	1/9	17,6
10× 8, 9½×7½	3/-	31/-
12×10, 11½×9½	4,6	50/-

NEW GREEN GLASS for Dark-room Windows, 2/- per square foot. TTF

JAPANESE ART TISSUES.—New Designs.

TTF

FOR COVERING PHOTOS. 1000 in box, C.-D.-V., 1/6; 1000 in box, Cabinet, 3/6.

SPECIAL CHEAP BLOTTING BOOKS.

To take any size print up to 10 × 8 containing 36 leaves of superfine stout white blotting paper, strongly bound and neatly finished, plain thick dark red covers. This paper is *very absorbent, and warranted chemically pure.*

Size of Books, 11×9. 8d. each, 7/6 per doz. TTT

A very cheap useful book, made of extra strong paper that does not come to pieces when damp.

UNTONED PRINT CASES.

LINED RUBY FABRIC for Storing Prints before Toning and Fixing. 4T

½-plate, 9d. each; Whole plate, 1/- each.

SHARP & HITCHMOUGH,

101 & 103 DALE ST., LIVERPOOL.

APTUS MASKS AND DISCS.

In Boxes, assorted Shapes. TTT

C.D.V. and Cabinet, Quarter and Half-plate ... ... } 1/- per Box.



5/6 each.
8/6 „
10/6 „

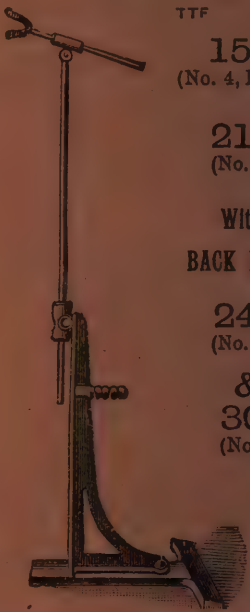
TTF

PORTABLE HEAD-RESTS.

Adjustable to all Positions. Well made in Brass and Bronze. Fit on any CHAIR-BACK. Most useful in Portraiture.

TT

HARRISON'S Highly Finished—every adjustment for Youths or Adults, sitting or standing, from 3 ft. 6 in. to 6 ft. high, with 6 brass engine wheel screws, 27/6, 36/-, 42/-, and 45/-.



TTF

15/-
(No. 4, Plain.)

21/-
(No. 3.)

With BACK REST,

24/-
(No. 3.)

& 30/-
(No. 2.)

STUDIO STANDS in Teak, 25/- each.
STUDIO STANDS in Mahogany, with Rack and screw adjustment, 50/- each.

'APTUS' METAL SHEATHS FOR PLATES.

FOR MAGAZINE HAND CAMERAS. 5T

Quarter-plate, 4/- per dozen. 5×4, 6/- per dozen.

'APTUS' METAL-BOUND SHEATHS FOR FILMS. TTT

Quarter-plate, 4/6 per dozen. 5×4, 6/6 per dozen. Half-plate, 9/- per dozen.

Special Terms to Dealers and Wholesale Houses.

ANY KIND OF SHEATH MADE TO ORDER.

FOR SPECIALITIES WRITE TO

SHARP & HITCHMOUGH,
PHOTOGRAPHIC INSTRUMENT MAKER,
LIVERPOOL.

'APTUS' NEGATIVE NAMING OUTFIT.

CONSISTING OF DIVISIONED CASE CONTAINING



140 Letters, in Patent dovetailed rubber metal-bodied type
21 Figures.
10 Points.
45 Spaces.
1 Holder.
1 Tin of Ink.
1 Pair Tweezers, and all necessary Sundries, with full directions for Numbering and Naming Negatives.

10/6 *Postage 6d. extra.* TTF

PLEASE NOTE

THAT our type is non-reversed, consequently it may be used for any kind of Printing on Paper, Wood, Cloth, and for endorsing Negatives.

MOREOVER the Type can be obtained in many sizes.

OWING to the Type being non-reversed it is not only cheaper but adapts itself for various purposes.

THE POCKET PHOTO ALBUM

FOR UNMOUNTED PRINTS. TT

An Album for One Shilling.

This is an entirely new departure in our popular Print Albums, and although produced at an *exceptionally low price*, quality has not been sacrificed to cheapness.

The photographs are easily inserted and removed, and cannot drop out when in the book. Each leaf has a neat tinted border which adds greatly to the appearance of the print.

IN ART CLOTH, WITH GOLD LETTERING. GREY LEAF.

No. 5503. To hold 12 ¼-plates ... 1/- each. | No. 5504. To hold 12 ¼-plates ... 1/6 each.

IN HALF-BOUND PERSIAN MOROCCO.

No. 5352. To hold 24 ¼-plates ... 2/- each. | No. 5353. To hold 24 ¼-plates ... 2/6 each.

MARCUS WARD'S ALBUMS. TT

¼-plate	... ...	one on page.	To hold 48	... ...	1 6	each
½ ,,	... ...	two ,,	,, 96	... ...	4 6	,,
¼ ,,	... ...	four ,,	,, 192	... ...	6 6	,,
½ ,,	... ...	one ,,	,, 48	... ...	1 0	,,
½ ,,	... ...	two ,,	,, 96	... ...	2 0	,,

SHARP & HITCHMOUGH, LIVERPOOL.



'APTUS' SPECIALTIES.

Bottles may be sent by Parcels Post when packed in our new Safety Cases. TTT

'APTUS' NEGATIVE RETOUCHING MEDIUM, in 1-oz. bots., 6d., post 8d.

'APTUS' FERROUS-OXALATE DEVELOPER. Always ready, will keep indefinitely. 10-oz. bottle, 1/-, by post 1/5; 20-oz. bottle, 1/10, by post 2/5.

'APTUS' SULPHO-PYROGALLOL DEVELOPER. Brilliant and clean Negatives always obtainable by this developer. Great latitude in exposures. Results cannot be equalled by any other formula. Sold in 5-oz. bottles, 1/-, by post 1/4; 10-oz., 1/10, by post 2/5; 20-oz, 3/6, by post 4/2.

'APTUS' HYDROKINONE DEVELOPER. A new and improved formula. Two solutions. 10-oz., 1/-, by post 1/5; 20-oz., 1/10, by post 2/5; 40-oz., 3/-, by post 4/2. Enough for 100 to 200 plates. Very quick in action. Specially suitable for Lantern transparencies.

'APTUS' INFALLIBLE DEVELOPER (Eikonogen). May be used repeatedly. 10-oz. bot., 1/-, by post 1/5; 20-oz., 1/10, by post 2/5; 40-oz., 3/-, post 4/2.

'APTUS' NEGATIVE REDUCER. Perfectly under control, 1/-, by post 1/3.

'APTUS' HYPO-ELIMINATER. Whatever you do have a bottle of the Hypo-Eliminater at once. It saves valuable time.

WHAT IT WILL DO.—It will eliminate every trace of Hyposulphite of Soda from your prints and plates in five minutes. It will disinfect the dark-room, &c. A bottle of this should be in the hands of every amateur and professional photographer. 10-oz. bot., 1/-, by post 1/5; 20-oz., 1/10, post 2/5; 40-oz. 3/6, post 4/2.

'APTUS' DEAD BLACK for Inside of Cameras, Lenses, &c., in bottles, 1/-, by post 1/3. Dries without heat on wood, brass, leather, &c.

'APTUS' NEGATIVE VARNISH, 2-oz., 6d., by post 8d.; 5-oz., 1/-, by post 1/3; 10-oz., 1/6, by post 1/10; 20-oz., 2/6, by post 3/-.

'APTUS' P.O.P. TONING. Gold and Sulpho-Cyanide in separate tubes to make 10-oz. of Toning. Packed in neat card box, 6d., by post 7d.

SHARP & HITCHMOUGH, Photographic Speciality Manufacturers,

LIVERPOOL.

DRY PLATES.

WE are regularly receiving consignments of all the Plates mentioned in the following List; and always have stock of the commoner sizes—viz. ½, ⅓, and ¼-plate.

We can supply any quantity, large or small, of any make of Plates to order in one week.

	4-pl. 4¼×3¼	5×4	8ter's 6½×3¼	Dbl. ¼ 6½×4¼	¼-pl. 6½×4¼	7½×5	¼-pl. 8½×6½	10×8	13×10	T&T 15×12
Ilford, Paget, Thomas, Mawson, Imperial, Gem, Cadett, &c.	1/-	1/7	2/2	2/2	2/3	3/5	4/3	7/3	10/6	18/-
"Mawson"	1/6	2/3	2/6	3/-	3/8	5/-	6/6	12/-	16/-	28/-
"Flash Light"										
"Lightning"										
Paget XXXXX										
" Backed										

AUSTIN EDWARDS AND ILFORD FILMS.

	Empress.	Special Rapid.
¼	1/6	2/-
5×4	2/6	3/-
½	3/8	4/6
1	6/6	8/-
10×8	10/-	12/-

LANTERN PLATES.

For Lantern Slides, Transparencies, &c.

Edwards' XL	3¼×3¼, 1/-	4¼×3¼, 1/6	6½×4¼, 3/8	8½×6½, 6/6
Imperial	" 1/-	" 1/-	" 2/3	" 4/3
Mawson	" 1/-	" 1/-	" 2/8	" 5/-
Thomas' New Plates	" 1/-	" 1/-	" 2/3	" 4/3
Alpha Plates & Black Tones	" 1/-	" 1/-	" 2/3	" 4/3
Cadett	" 1/-	" —	" —	" —
Paget Prize Rapid or Slow	" 1/-	" 1/-	" 2/3	" 4/3
England's Rapid or Slow	" 1/-	" —	" —	" —

PRINTING-OUT PAPERS.

ILFORD P. O. P., PAGET, "SOLIO" } All the same Price, Matt and Glossy.

GELATOID, IMPERIAL

4¼ × 3¼	Packet containing 36 sheets
5 × 4	" " 24 "
6 × 4½	" " 24 "
6½ × 4¾	" " 16 "
7½ × 5	" " 13 "
8½ × 6½	" " 9 "
10 × 8	" " 6 "
12 × 10	" " 4 "

1/- per packet.

Postage 2d. extra up to ½, 3d. extra on 10×8 & 12×10.

Cabinet Box, 144 sheets, 5⅞×4	5/-
C.-D.-V. Box, " 3⅛×2⅛	1/10
Sheets 24½×17, packed in sealed tubes, per quire	16/-
" 24½×17, " " per half-quire	7/6
" 24½×17, " " per quarter-quire	4/-
" 24½×17, " " per one-twelfth	1/4

PLEASE SEND TRADE CARD FOR DISCOUNTS.

SHARP & HITCHMOUGH,

PHOTOGRAPHIC INSTRUMENT MAKERS,

LIVERPOOL.

ENLARGING AND FINISHING.

Size.	Price of Plain Enlargements.	Finished in Black and White, extra.	Painted in Water Colours, extra.	Mounting in Cut Mounts.
12 ×10	2/6	5/-	10/-	-/9
15 ×12	3/-	6/-	12/6	1/-
23 ×17	5/-	7/6	20/-	1/3
24 ×20	7/6	10/-	25/-	2/-



Enlarged or Reduced Negatives made from Prints or Negatives.

Transparencies, Copies, Enlargements, &c., made at the lowest prices consistent with high-class work. T

DEVELOPING.

¼-plate, 2/6 per dozen. | ½-plate, 3/- per dozen. | Whole-plate, 4/6 per dozen.

RETOUCHING, &c.

Cartes (at Photographers' own prices)... from 3d. each, according to amount of work.
Cabinet ... ... „ 9d. „ „ „ „
Whole-plate... ... ... „ 1/- „ „ „ „

'APTUS' SENSITIZED PAPER.

Our Ready Sensitized Paper is, without doubt, the very finest that can be made. Its fine quality is acknowledged by hundreds of leading men throughout the world.
Per Ream, £12 10/-; Quire, 14/-; Half-Quire, 7/-; Quarter-Quire, 3/9; 3 Sheets, 2/-
2 Sheets, 1/6; Sample Sheet, -/10, postage extra.

READY CUT FOR MOUNTING.

	C.-de-V.'s.		5⅜×4 Cabinets.		Brilliant.	T
¼-Quire Box, containing	258	or	90	...	4/-	post free 4/2
½ „ „	516	„	180	...	7/6	„ 7/9
1 „ „	1032	„	360	...	15/-	„ 15/6
1 Sheet Packets „	43	„	15	...	1/-	„ —

Odd Sizes cut to Order at a Moment's Notice.

'APTUS' FERRO-PRUSSIATE PAPER

IN PACKETS OF 24 PIECES.

NO DEVELOPING, TONING, OR FIXING.

WHITE LINES ON DEEP BLUE GROUND. TTT

4¼×3¼, 6*d.*; ½, 1*s.*; Whole, 2*s.*; ⅛, 3*s.* per packet.

SHARP & HITCHMOUGH,

PHOTOGRAPHIC INSTRUMENT MAKERS

LIVERPOOL.

ENGINEERING PHOTOGRAPHY.

BLACK LINE (Water Bath only).

A1 The Latest Process.
The Cleanest Process.
The Simplest Process. **A1**

The operating is the same simple procedure followed in taking Ferro-Prussiate Copies.

RECENT researches into the powers of the requisite chemical agencies have led to a production of a sensitized coating giving a BLACKER LINE and WHITER GROUND than has previously been obtainable.

Small Roll for testing (with instructions) will be forwarded for 6d.

EXPOSURE REQUIRED.

5 to 8 minutes in bright sunshine. 8 to 15 minutes in fair weather. ½ hour to 1 hour in dull weather. These periods for Exposure are as near as can be given, having regard to the varying properties of light.

TARIFF.

FOR ROLLS OF 32 FEET LENGTH.

	INCHES WIDE	30	32	40
Extra Thin (for Postage)		7/-	7/6	9/-
Parchment (Tough and Durable)		8/-	9/-	11 -
MEDIUM		7/-	7/6	9 -
Thick		8/6	9/-	10/6

Cost of Outfit to Print Copies 40 by 27.

Printing Frame, Glass View, 40 by 27 superior, and Felt
Water Bath, 42 by 30
Roll of 30 in. Sensitized Paper
} **£5 5s. 0d.** CARRIAGE PAID

BLACK LINE PRINTS, FROM TRACINGS.

Imperial, 30 by 22	per copy, 3 0
D. Elephant, 40 by 27	,, 4/0
Antiquarian, 53 by 31	,, 5/0

Special care taken of Plans, &c., entrusted to us, but we do not hold ourselves responsible for accidental damage or loss in transit; perfect secrecy guaranteed with respect to drawings and plans.

WHOLESALE FROM

SHARP & HITCHMOUGH,
101 & 103 DALE STREET, LIVERPOOL

SILVER PRINTING.

Sizes.	PRINTING, including Toning and Fixing.		Mounting on Plain Toned Mounts.	Mounting on Gilt Bevel Edge India Tint or Oxford Line Mounts.	Toning and Fixing only.	
	Silver. Per doz.	P. O. P. Per doz.			Silver. per doz.	P. O. P. per doz.
			per doz.	per doz.		
C. de V.	1/-	1/6	-/6	1/-	-/6	-/9
4¼ × 3¼	1/6	2/3	-/6	1/-	-/6	
5 × 4	1/9	2/7	1/-	1/-	-/6	
5¾ × 4 Cabinet	2/-	3/-	1/6	1/9	-/9	1/1
6½ × 4¾	2/6	3/9	1/6	2/-	1/-	1/6
7½ × 4⅜	4/-	6/-	1/9	2/-	1/-	
8 × 5	4/6	6/9	2/-	2/6	1/-	
8½ × 6½	5/-	7/6	2/-	3/6	2/-	3/-
9 × 7	6/-	9/-	3/-	6/-	2/-	
10 × 8	7/6	11/3	3/-	6/-	2/3	3/4
11 × 9	10/-	15/-	4/-	7/6	2/6	3/9
12 × 10	10/-	15/-	4/6	7/6	3/6	5/3

P. O. P. prints Enamelled or Matt surface and backed, double the price of Silver Printing.

For not less than half-dozen of any one negative.

PLATINOTYPE PAPER.

(IN SEALED TIN TUBES.) T

Size	½-plate	5×4	½-plate	½-plate	10×8	12×10	15×12	26×20
No. of sheets in Tube ...	24	24	24	24	24	12	12	3
Price	1/6	2/3	3/6	6/-	8/6	6/6	9/6	6/6
Postage ...	3d.	3d.	3d.	3d.	3d.	3d.	5d.	5d.

EASTMAN'S NIKKO & PLATINO BROMIDE PAPERS

TO ENGINEERS.

FERRO-PRUSSIATE PAPER.

White Lines on Blue Ground. TTF

32 feet × 30, 32, 40 inches.

C. 2.—Medium, First Quality	5 6	6 [illegible]	7 6
C. 3.—Thick, „ „	6 0	7 0	8 0
C. 5.—Thick, mounted on cotton	8 [illegible]	9 6	11 6
D. 1.—Ferro-Prussiate cloth	[illegible] 6	—	12 0

SHARP & HITCHMOUGH, 101 & 103 DALE ST., LIVERPOOL.

WAREHOUSES AND WORKSHOPS—GRESHAM BUILDINGS.

TELEPHONE 2495. TELEGRAMS: 'APTUS-FINDER, LIVERPOOL.'

'APTUS' DEVELOPING SINK.



No. 1 Size for developing Plates up to 10×8, complete with Rose tap for cistern, 37/6 TTF

No. 2 Size for developing Plates up to 12×10, and Rose Tap for the main. Each table is fitted with rack for dishes, 45/-

Cheap Table, with Sink and Rack. Legs fold for packing.



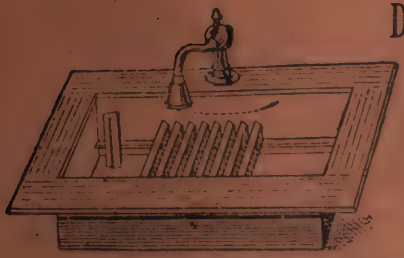




'APTUS' DARK ROOM TAPS.

TTT 7/6 each.

DARK ROOM FITTINGS.



COMPLETE

20/-

Packing 1s. extra.

19" × 13" × 5"

Enamelled White inside, Black Japan outside, fitted with waste pipe and syphon, draining rack, swan-neck rose-tap. TT

The fittings may be had separately as under:—

Developing Sink	7/6	Swan-neck rose tap, tested for main	7/6
Draining Rack	2/6	Ditto, lighter make for cistern	5/6
Syphon	2/6		

'Young Men's Christian Association, Birkenhead, *January 17th*, 1891.
'We are very well satisfied with the way you have executed your contract.
'Yours faithfully, (signed) J. FORSYTH, *Secretary*.

SHARP & HITCHMOUGH

Have all the latest Novelties appertaining to Photography.

'APTUS' PORTABLE DARK ROOMS.

THE illustrations below represent our now well-known Dark Rooms. These Dark Rooms are made in sections, so that in travelling they can be packed flat. The sections—six in number, consisting of four sides, a roof, and a floor—can be easily put together in about five minutes. The roof is provided with a ventilator, while the floor is raised some two inches from the ground, so that a current of air is always circulating. Every board is tongued into its fellow. The fittings consist of two shelves, a sink, 12×9 ins. (this size is suitable for developing up to half-plate), with a pipe to conduct the waste into a pail. A bench is provided on which to stand the odds and ends required. The window, glazed with ruby or orange glass, works in a groove, so that it can be opened at any moment for making exposures by contact, as Lantern Slides, Bromides, Opals, &c. Just below the window is a bracket on which to stand a lamp, thus dispensing with the necessity of having the heat and smell of the lamp inside.



F1.



F2.

TF

Size.	F1.—Flat Roof. £ s. d.	F2.—Sloping Roof and Space for Lamp. £ s. d.
6-ft. 6-in. × 3-ft. 6-in. × 3-ft. 0-in.	2 2 0	... 3 0 0
6-ft. 6-in. × 3-ft. 6-in. × 3-ft. 6-in.	2 10 0	... 3 10 0
6-ft. 6-in. × 4-ft. 0-in. × 3-ft. 6-in.	2 18 0	... 4 0 0
6-ft. 6-in. × 4-ft. 0-in. × 4-ft. 0-in.	3 6 0	... 4 10 0

Stained and Varnished, 5/- to 8/- extra.

SHARP & HITCHMOUGH'S Demonstration Tables and Portable Dark Rooms for Photographic Societies, Lecturers, and Private Houses.

DARK ROOMS FITTED UP.

SUNDRIES.

Argentometers, or Bath Testers, with Glass Cell TT	2/6
Clips of Wood, per gross, 9/6, TT ... ... per doz.	1/-
Scales and Weights in oak box, brass pans complete, with weights TT	2/6
" " superior, glass " " " TT	3/6
" " " " " large size, with adjustable Standard ... ... each	6/6
Silver Wire, stout, for corners of carriers, per foot T	1/-
Wood grooving, 11 in. wide, per foot	1/-
Stirring Rods of Glass, each ... ... -/1, -/2, and	-/4
Tube and Cake Colours, Chinese White, &c., each ... ... T...	-/2

Prices quoted in this Catalogue are for Cash with Order only.

PURE CHEMICALS.

	1 oz.	¼-lb.	½-lb.	1 lb.
Acid, Acetic Glacial, Solid, 50°	-/2 ...	-/5 ...	-/8 ...	1/-
" ditto, in Winchester Quarts	— ...	— ...	— ...	-/11
" Citric, Cryst.	-/3 ...	-/10 ...	1/6 ...	2/6
" Hydrochloric, pure	-/1 ...	-/3 ...	-/6 ...	-/10
" Nitric, pure	-/2 ...	-/5 ...	-/8 ...	1/-
" Pyrogallic (Schering's)	1/- ...	— ...	— ...	—
" Sulphuric, pure	-/1 ...	-/3 ...	-/6 ...	-/9
" Sulphurous	-/2 ...	-/4 ...	-/7 ...	1/-
Alum, Powdered ... ... 7 lbs. 1/3 ...	— ...	— ...	— ...	-/3
" Chrome, Crystal	-/2 ...	-/5 ...	-/8 ...	1 -
Ammonia, Liquid, 880°	-/1 ...	-/3 ...	-/4 ...	-/7
Ammonium, Bromide	-/3 ...	-/10 ...	1/6 ...	2/6
" Carb., pure	-/2 ...	-/6 ...	1/- ...	1/9
" Chloride, pure	-/2 ...	-/5 ...	-/8 ...	1/-
" Sulphocyanide (Schering's) in bottles ...	-/4 ...	-/10 ...	1/6 ...	2/6
Borax, Pulv.	-/1 ...	-/3 ...	-/4 ...	-/6
Collodion, Mawson's Negative	-/6 ...	2/- ...	3/8 ...	6/8
" 4 lbs., Winchester Quarts, 20/-	— ...	— ...	— ...	—
" Mawson's Enamel	-/4 ...	1/3 ...	1 9 ...	3/-
Calcium, Chloride, Cryst.	-/1 ...	-/3 ...	-/6 ...	1/-
Chalk, Prepared	-/1 ...	-/1½ ...	-/2 ...	-/4
Copper, Sulphate	-/1 ...	-/3 ...	-/4 ..	-/6
Eikonogen	1/2 ...	— ...	...	—
Ferrous Oxalate	-/3 ...	-/10 ...	1/6 ..	2/6
Gelatine, White, Gold Label	-/5 ...	1/6 ...	2/6 ...	4/6
" " No. 1	-/4 ...	1/- ...	2/- ...	3/6
" " No. 2	-/3 ...	-/10 ...	1/6 ...	2/6
Glycerine, pure, colourless	-/2 ...	-/6 ...	-/9 ...	1/6
Gold, Chloride (Johnson's). 15 grains, 1/9	— ...	— ...	— ...	—
" " " 1 dozen tubes, 20/- ...	— ...	— ...	— ...	—
Hydrokinone, pure, in bottle (Schering's	-/10 ...	3/- ...	5/6 ...	10/6
Indiarubber Solution, in bottle	— ...	1 - ...	1 - ...	2/6
Iron, Sulphate...	-/1 ...	-/1½ ...	-/2 ...	-/3
" and Ammonia	-/2 ...	-/4 ...	-/6 ...	-/9
Kaolin	-/1 ...	-/2 ...	-/3 ...	-/4
Lead Acct.	-/2 ...	-/4 ...	-/6 ...	1/-
Lime, Chloride, pure...	— ...	— ...	-/6 ...	-/8
Litmus, Red and Blue. Per book, 2d. ; per doz. 1/6...	— ...	— ...	— ...	—

Special quotations for large quantities, from

SHARP & HITCHMOUGH, LIVERPOOL.

PURE CHEMICALS.

	1 oz.	¼ lb.	½ lb.	1 lb.
Magnesium Ribbon ... ... per yard, 1d.	... 1/10	... —	... —	... —
,, Powder (Schering's) in bottles	... 1/6	... 5/6	... 10/6	... 20/-
Potass, Chloro-Platinite, 15 grains, 1/4; 60 grains, 4/3	—	... —	... —	... —
,, Carbonate Anhydrous	-/3	... -/9	... 1/3	... 2/-
,, ,, pure, dry	-/2	... -/5	... -/8	... 1/-
,, Caustic, in sticks, pure	-/2	... -/6	... -/10	... 1/6
,, Chlorate, pure	-/2	... -/5	... -/8	... 1/-
,, Bichromate	-/2	... -/5	... -/8	... 1/-
,, Nitrate (Needle's), pure	-/2	... -/4	... -/6	... -/10
,, Ferricyanide (Red)	-/4	... 1/-	... 1/9	... 3/0
,, Ferrocyanide (Yellow), pure	-/2	... -/7	... 1/-	... 1/8
,, Oxalate, Neutral ... ... 7 lbs. 5/-	... -/1	... -/3	... -/5	... -/9
,, Meta-Bisulphite	-/3	... -/10	... 1/9	... 3/-
Potassium, Bromide...	-/3	... -/9	... 1/5	... 2/8
,, Iodide (variable)	1/3	... —	... —	... —
Rochelle Salts	-/2	... -/8	... 1/-	... 2/-
Silver, Nitrate, best Commercial	2/6	... —	... —	... —
Soda, Acetate, pure	-/1	... -/3	... -/5	... -/9
,, Carbonate, pure crystals	-/1	... -/3	... -/5	... -/9
,, ,, ...	-/1	... -/2	... -/4	... -/6
,, Hydrate, Sticks	-/2	... -/7	... 1/-	... 1/9
,, Hyposulphite 7 lbs. 1/-, 14 lbs. 1/9, cwt. 9/6	... —	... —	... —	... -/2
,, Phosphate	-/2	... -/5	... -/8	... 1/-
,, Sulphite, pure crystals ... cwt. 15/-	... -/1	... -/3	... -/5	... -/8
Tungstate	-/2	... -/6	... -/10	... 1/6
Tripoli	-/3	... -/10	... 1/6	... 2/6

AMIDOL-ANDRESEN.—In tins of 1 oz. **2/-**; 4 oz. **7/6**; 8 oz. **15/-**.

AMIDOL CARTRIDGES.—To make 7 or 14 ozs. of Solution. In boxes of 6, **2/6**.

EIKONOGEN.—In tins of 1 oz. **1/2**; 4 oz. **3/6**.

EIKONOGEN CARTRIDGES.—In boxes of 10, **3/-**

RODINAL.—In bottles of 3 oz. **1/6**; 8 oz. **3/-**. TT

METOL-ANDRESEN.—In tins of 1 oz. **2/6**.

METOL CARTRIDGES.—In boxes of 6, **3/-**

FIXING CARTRIDGES.—10 Cartridges, **1/9**.

TONING AND FIXING CARTRIDGES.—In boxes of 10, **3/9**.

BOTTLES.

1 oz.	Cork, -/1	Box Corks, -/2	Stoppers, -/3
2 oz.	,, -/1	,, -/2	,, -/3
4 oz.	,, -/2	,, -/2	,, -/4
5 oz.	,, -/2	,, -/3	,, -/4
8 oz.	,, -/3	,, -/3	,, -/5
10 oz.	,, -/3	,, -/3	,, -/6
16 oz.	,, -/4	,, -/4	,, -/6

20 oz. Cork ... -/4 Stopper ... -/8

WINCHESTERS.

Cork, 4 lbs. ... -/10	Stopper, 4 lbs. 1/-
,, 5 lbs. ... 1/-	,, 5 lbs. 1/3

TINS.

½ gall. 1/-	2 gall. 2/-
1 ,, ... 1/4	3 ,, ... 2/8

1-lb. Tins for Hypo, 1/6 dozen.

7-lb AIRTIGHT TINS FOR HYPO. &c., 6/- per doz. TTF

All Prices in this List subject to fluctuations of the market. Bottles charged extra.

SHARP & HITCHMOUGH, 101 and 103 Dale Street, Liverpool.

'APTUS' PORTABLE STUDIO.

SUMMER-HOUSE * * * DARK-ROOM OR * * * BATHING TENT.

IN THREE SIZES.



No. 1.—7 ft. × 3 ft. 6 in. × 3 ft. 6 in. Price **£2 2 0.** Weight, 20 lbs. Size packed, 5 ft. 6 in. × 4 in. × 4 in.

No. 2.—7 ft. × 4 ft. × 3 ft. 6 in. Price **£2 15 0.** Weight, 25 lbs. Size packed, 5 ft. 6 in. × 5 in. × 4 in.

No. 3.—7 ft. 6 in. × 4 ft. 6 in. × 3 ft. 6 in. Price **£3 10 0.** Weight, 30 lbs. Size packed, 6 ft. × 5 in. × 5 in.

CAN BE ERECTED IN A FEW MINUTES.

Each Studio fitted with the 'Aptus' Background.

'APTUS' DEVELOPING SLEEVES.



For use when DEVELOPING, TONING, FIXING, WASHING, &c. TTF

Keep your cuffs clean and dry.

WATERPROOF MATERIAL.

1/6 per pair; postage 1*d.* extra.

SHARP & HITCHMOUGH, Makers,

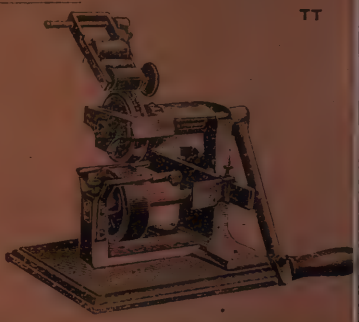
LIVERPOOL.

THE VERY LATEST.

A Simple Machine to Block your own Mounts in Colours, Gold, Silver, White or Plain.

A VAST SAVING BY DOING YOUR OWN WORK.

TT



A CHILD CAN USE IT.

PRICE, including your own name and address in Embossed Letters on Brass,

£4 10 0

Any other dies may be inserted in the Machine at will.

Cost of engraving extra dies, from **7/6.**

No Studio should be without one no matter how small a business is done, in fact the smaller the business the more you will appreciate the Press, for the reason that a great many Studios do not buy mounts in big lots, hence, if they possess the Press they can order many kinds, styles, and sizes and do their own blocking, printing, &c.

The machine will emboss the mount, print it in any colour Ink, or in Gilt Silver, Fire Green Bronze, Gold Aluminum or Silver Leaf. Many leading Studios use it for large Platino Mounts and other odd sizes.

Send for samples of work done on this celebrated machine. No photographer should be without one.

WHY CARRY A LARGE CAMERA?

When you can easily enlarge the Actual Negative by means of

THE CRESCO-FYLMA ENLARGING SOLUTIONS.

THIS marvellous process, by its simplicity, perfect action, and cleanliness, will revolutionise dry-plate photography. The operator can enlarge in full daylight, darkness being unnecessary, and has the mysterious delight of seeing, in the course of a few minutes, his quarter or half-plate *grow* to double its area. This takes place without risk or distortion, and the artist will observe that the enlarged film appears to have *gained* in detail, and yet to have lost none of its tones or values. The film, being built up by the chemicals used in the Solution, is not weakened, nor is it at all difficult to manipulate, and is not rendered unsound in any degree whatever.

Is this process difficult? No, it is simplicity itself.

TTT

CRESCO-FYLMA POWDERS.

Price 6d. per packet; post free, 7d.

Only require Mixing with Water for Use.

SHARP & HITCHMOUGH, Liverpool.

PRINTING P.O.P. AT NIGHT by the

Incandescent Gaslight.

SAVE A CLEAR 50 PER CENT. ON YOUR GAS BILL, AND OBTAIN TREBLE THE LIGHT.

Can be attached to existing gas fittings.
Clean, Cool, Steady, and very Brilliant.
Smoke, Smell, and Impurities dispensed with.

35 Candle-power Burner, consuming $1\frac{3}{4}$ cubic feet of gas per hour 5/6
60 Candle-power Burner, consuming $3\frac{1}{4}$ cubic feet of gas per hour 6/6

Large Illustrated Price List, 117 Engravings, Post Free.

'APTUS' APPARATUS FOR X RAYS.

FINEST QUALITY.

Specially exhausted Focussing Tubes of the Newest Design have the advantage o equally reducing the length of Exposure and improving the sharpness of the resulting image.

SET A.—For ordinary purposes:—Coil, 2 in. Spark ... £5 0 0
Crookes' Focus Tube 1 1 0
Battery, three cells, improved 2 9 0
£8 10 0

SET B.—Coil, 3 in. Spark, and Commutator. Tube as above, and suitable Battery 16 0 0

SET C.—Coil, 4 in. Spark, and Commutator. Tube as above, and suitable Battery 20 0 0

Large Coils to Order, giving a Spark up to 20 inches, Bunsen and Bichromate Cells.

FLUORESCENT SCREENS.

The bones of the hand, arm, &c., can be seen with these Fluorescent Screens, with the aid of the X Rays.

Nos. 3 and 4 are specially recommended, being well and evenly coated, and giving a clear, sharp image.

No. 1.—Barium Platino-Cyanide, 8 by 6 in. ... ... each £0 8 0
No. 2.—Potassium Platino-Cyanide, 6 in. by 4 in. 0 15 6
Ditto ditto complete in Box for Viewing .. 0 18 6
No. 3.—Potassium Platino-Cyanide, 8 in. by 6 in. 1 7 6
Ditto ditto complete in Box for Viewing .. 1 13 0

TUBE-HOLDERS, 5/- EACH.

SHARP & HITCHMOUGH, Liverpool.

'APTUS' CHEMICAL BALANCE.



A Sensitive Balance for Photographic Chemicals, accurately weighing up to **2** ounces.

TTT

PRICE 1/6; Postage, 2d.

NOTE.—A cheap imitation is on the market, offered at a less price, but it only weighs in drams. The 'APTUS' will weigh 2 ounces.

TTT



'APTUS' FLASH LAMP.

The first and still the best.

PRICE 1/6; POSTAGE 3d. Extra.

50 PER CENT. MORE LIGHT.

THE BEST. — THE CHEAPEST.

Liberal Terms to the Wholesale and Retail Trades.

Dealers should write for Discounts on our Specialities.

A.B.C. DEVELOPER. TTF

A MUCH WANTED NOVELTY.

Printing at night, and in dull weather, on any Gelatino-Chloride Paper, no dark-room or special paper being required. Whole process from commencement of exposure to completion of full print can be done in an ordinary living room, positively within seven minutes.

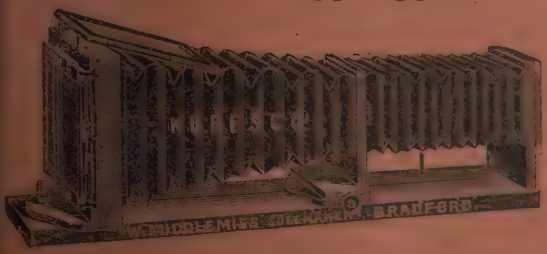
One Package of A. B. C. DEVELOPER, costing 2/-, will produce 8 dozen Cabinet prints; or a Package costing 1/- will produce half that number of prints. Postage 2d. extra.

All Prices in this List subject to fluctuations of the Market.

SHARP & HITCHMOUGH, 101 and 103 Dale Street, Liverpool.

'KORESCO' Enlarging Camera.

$8\frac{1}{2} \times 6\frac{1}{2}$.



PRICE COMPLETE, 30/-

Have you a $\frac{1}{4}$-plate APTUS Hand Camera?
Have you a Pocket Kodak?
Have you a Frena Camera?
Do you wish to make Enlargements?

By means of the 'KORESCO' ENLARGING CAMERA you can make Half-plate or Whole-plate Enlargements from any of the above negatives on bromide paper or on glass.

THE APPARATUS COMPRISES—

Camera, Rack Focus Arrangement, Achromatic Lens, Whole-plate Book Slide, and Half-plate Carrier $\frac{1}{4}$-slide, 5s. extra.

BEST WORKMANSHIP.

15 x 12, AS ABOVE, £4 0 0.

STITCHED CAMERA HANDLES



In the following colours and sizes :—

1/- each. Black, Nut Brown, Saffron, and Russet, $4\frac{1}{2}$, $4\frac{3}{4}$, and $5\frac{1}{2}$ inches.
Six Handles on Card, complete with screws, at **6/-** per Card. Six Cards at a time, **5/3** each Card. Twelve Cards at a time, **4 6** each Card.

SHARP & HITCHMOUGH, LIVERPOOL.

WELDLESS STEEL CYLINDERS FOR COMPRESSED GASES,

Tested up to 2 tons to the square inch, fitted with Improved Valves.

Contents in Cubic Feet.	Price including Valves, Unions, &c.	Price of Oxygen and Hydrogen.
6 ..	31/6 ..	4d. per foot.
10 ..	35/- ..	
12 ..	36/- ..	

Contents in Cubic Feet.	Price including Valves, Unions, &c.	Price of Oxygen and Hydrogen.
15 ..	37/- ..	3d. per foot. TF
20 ..	40/- ..	
30 ..	46/6 ..	
40 ..	52/3 ..	2½d.,

We keep in stock Cylinders, Valves, Nipples, Unions, Regulators, Gauges, and Keys.

Red and Black Tubing, very thick, 4d. and 5d. per foot.

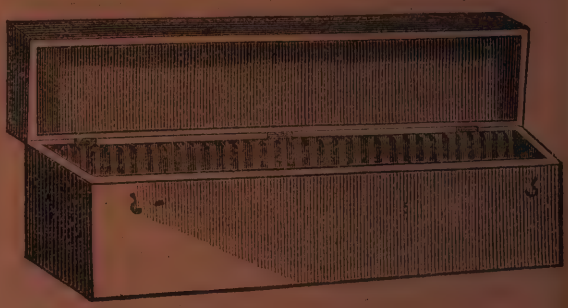
HYMN SLIDES, 8D. EACH.

WITH ORNAMENTAL BORDER.

CATALOGUE FREE BY POST.

LANTERN BOXES. TT

To hold 50 ... ... 1/- each.



TRANSFER PICTURES,

FOR THE EASY & INEXPENSIVE PRODUCTION OF COLOURED LANTERN SLIDES.

Marvellous Effects. 3s. 6d. per Sheet (3¼×3¼) of One Dozen. TTF
New Designs, 4/6 per Sheet.

In many respects these Transfers are superior to Hand-painted Slides. List of Subjects on application.

150 SUBJECTS IN SETS OF 12.

Book of Lectures, 1/-

FINE TAP REGULATOR, 6/6. TTF



'APTUS' CENTREING JET.

Very simple. TTT

Blow-through Jet ... ... 11/- ...
Tray with new Adjustment ... 7/6 ... } 18/6.

The latter may be used with any ordinary Jet, price 7/6.

SHARP & HITCHMOUGH, Designers and Manufacturers, LIVERPOOL.

'APTUS' LANTERN MATS,

150 for 1s. All Shapes and Sizes TTT

PORTABLE ELEVATORS,

Up to 8 feet, 8s. 6d. each.

OPAQUE
LANTERN SHEETS.

Prepared with Pure White, Flexible, Opaque Surface.—Mounted on Roller; Batten, Cord, and Pulleys.

8ft. × 8ft.	.. 22/-	10ft. × 10ft.	.. 31/6
9ft. × 9ft.	.. 25/-	12ft. × 12ft.	.. 42/-

To be obtained from all Wholesale and Retail Dealers, or from the Makers,

SHARP & HITCHMOUGH,
LIVERPOOL.

The above in Larger Sizes. TTF

14 × 14 feet, **56/-** ... 15 × 15 feet, **67/6** ... 16 × 16 feet, **73 6**

SAMPLES ON APPLICATION.

UP TO DATE. The Very Latest Novelty for '97-8.

USEFUL IN SUMMER OR WINTER.

Now introduced for the second time by

SHARP & HITCHMOUGH,

WHO ARE THE ONLY MAKERS.

'Aptus' Combination Lantern Screen and Background.

TTF

ABSOLUTELY OPAQUE.

PLEASE EXAMINE THE SAMPLE.

Mounted on Rollers, top and bottom in one piece without seam.



5 × 5 Feet. 13 -

6 × 6 Feet. 15 6

7 × 7 Feet. 18 6

8 × 8 Feet. 22 -

Cords and Pulleys, 2/- extra. Portable Elevators, 7/6, 7 ft.; 8/6, 8 ft.

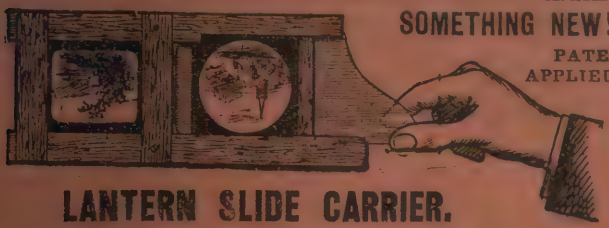
Model Elevator and Screen, post free, 2/-.

SHARP & HITCHMOUGH, LIVERPOOL.

— 'APTUS' —

PRESTO SLIDE CARRIERS.

1/6 each. Superior, 2/- each. Postage, 3*d.* extra. TTF



SOMETHING NEW!

PATENT APPLIED FOR.

LANTERN SLIDE CARRIER.

THE Chief Advantage of this Carrier is that the Slides are *Inserted and Withdrawn from one Side of the Lantern*, thus enabling one Operator to attend to the Slides with ease and comfort.

No Reaching over the LANTERN TO WITHDRAW SLIDES.
Thick or thin Slides are held in perfect register.
An effect almost equal to dissolving is obtained with this Carrier.
The Slides are easily inserted and withdrawn.
No friction to wear away the binding on the slide. TT



To use the Carrier it is first put in the Lantern in the usual way. The Slide is inserted and the runner pushed along and withdrawn. The next slide is then put in the Carrier and the operation repeated, the action of withdrawing the runner bringing the slide shown with it, and leaving the second one, the whole being accomplished with a pleasing dissolving effect.

Each Carrier, neatly packed in box,
PRICE 4/- Postage 3d.

— 'APTUS' — TTF

LANTERN SLIDE BINDING VICE.

For firmly holding the slide and cover glass in position while applying the binding. Price 1/- each. Post 2d.

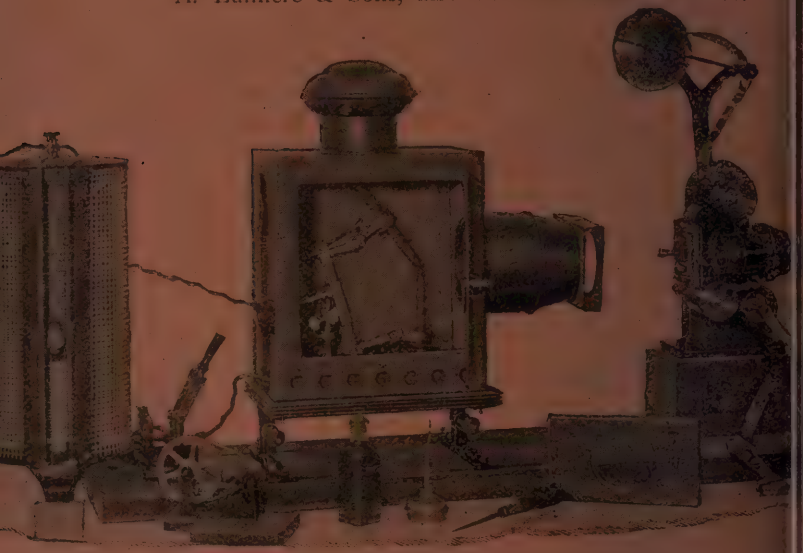
SHARP & HITCHMOUGH,
101 & 103 Dale Street, Liverpool.
WORKS AND WAREHOUSE—
Gresham Buildings.

'A Perfect Life-motioned Picture Projecting Machine.'

THE ⁘ BIOSCOPE.

THE BEST EXTANT.

Adapted for use of the famous superior film subjects of A. Lumière & Sons, also all other makes. TTF



PRICE COMPLETE, £26.

PARTICULARS FROM

SHARP & HITCHMOUGH, Dealers in Bioscopes and Lumiere Films,

DALE STREET, LIVERPOOL.

'PNEUMATIC'
LANTERN SLIDE * * DISSOLVING CARRIER.

(PATENT APPLIED FOR.)

THE object of this Invention is to change Lantern Slides in Single Lanterns without apparent movement, and to give a Dissolving Effect by **ONE MOVEMENT ONLY.** The Carrier is fixed and centred in the Lantern in the usual manner, the Shutter fixed to Lens, a sharp squeeze on the Ball instantly closes the Shutter, and then moves the Slide and automatically centres it, and it is then projected on the Screen. All the movements are done so quickly that the effect produced is as near dissolving as can be accomplished with a Single Lantern. The Slides are all placed into the Carrier from one side of Lantern. One great advantage of this Carrier is that it will fit any full-sized Lantern **WITHOUT ANY ALTERATION,** and, as there are no mechanical connections between Carrier and Shutter, it will suit Lenses of various *Foci*. The Clip fitted to the Shutters is arranged to fit all ordinary Lantern Objectives, but, when ordering, please oblige by sending exact diameter of Lens Hood.

PRICE 17/6. POSTAGE 6d.

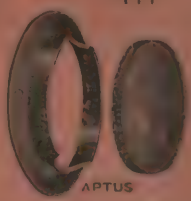
— 'APTUS' —

ISOCHROMATIC SCREENS.

Mounted ready for use in Camera.

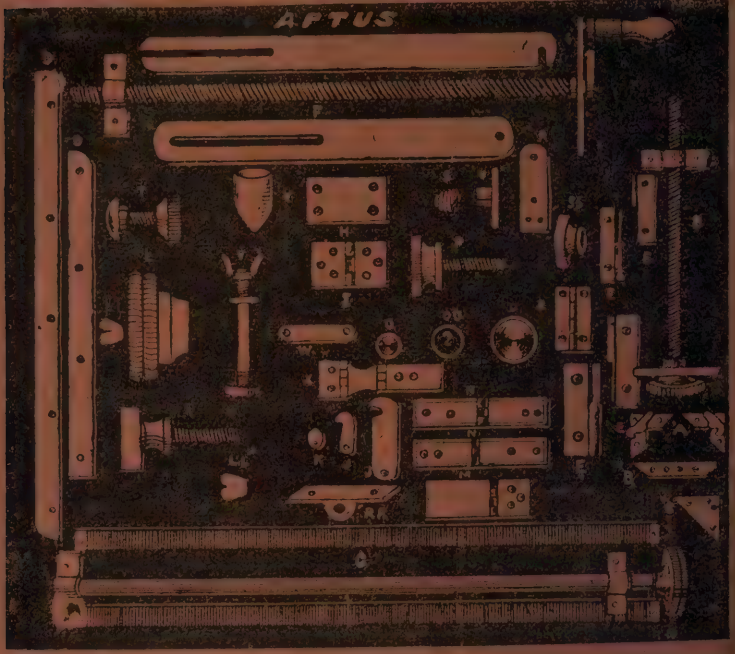
	Screen only.	Mounted.
No. 1, 2 in. diam., price	1/9 ...	3 6
,, 2, 2½ ,, ,,	2/9 ...	4 6
,, 3, 3 ,, ,,	3/9 ...	5 6

Increase of exposure with No. 1, about 2½ times.
Ditto, No. 2, about 5 times.
Ditto, No. 3, about 10 times.



SHARP & HITCHMOUGH,
101 & 103 DALE STREET, LIVERPOOL.

SPECIALTIES IN CAMERA FITTINGS.



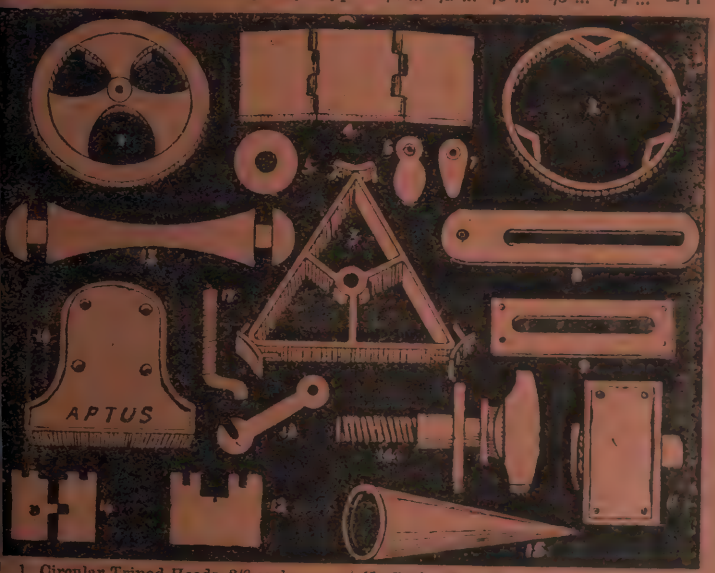
Special Quotations for Wholesale Quantities.

		¼	½	¾	10×8	12×10	15×12
A.	Strong Screw for Cameras, folding handle, each	2/6	4/-	6/6	8/6	10/6	12/6
B.	Lighter Screw for Cameras	2/-	3/6	5/6	7/6	8/6	10/6
C.	Rack and Pinion set, special size to order	3/-	5/-	7/6	10/6	12/6	15/-
D.	Brass Strips for Camera Backs, per pair	-/6	-/9	1/-	1/3	1/6	2/-
E.	Pull-off Hinges, per pair	-/2	-/2	-/3	-/3	-/3	-/3
F.	Stretcher for Le Meritoire, lacquered ...	1/-	1/6	2/-	2/6	3/-	3/6
G.	,, Instantograph ,, ...	1/-	1/6	2/-	2/6	3/-	3/6
H.	Plates for Stands, each	-/1	-/1	-/2	-/2	-/2	-/2
I.	Hinges for Tail Boards, per pair ...	-/2	-/3	-/4	-/4	-/6	-/6
J.	Hooks for Slides, per pair	-/1	-/1	-/1	-/1	-/1	-/1
J.	,, Stands, ,, ...	-/2	-/2	-/3	-/3	-/4	-/4
K.	Turn Buttons for Slides, per pair ...	-/1	-/1	-/1	-/1	-/1	-/1
L.	Pinion Milled Head...	-/6	-/8	-/8	-/9	-/10	1/-
LL.	Cone Nut for ,, ...	-/2	-/2	-/2	-/2	-/2	-/2
M.	Clip Hinges for Dark Slides, per pair ...	-/2	-/2	-/3	-/3	-/4	-/4
N.	Hinges for Focussing Glass, ,, ...	-/2	-/2	-/3	-/3	-/4	-/4
O.	Rising Front Screws, each	-/4	-/5	-/6	-/8	-/8	-/8
OO.	Ivory Numbers for Slides	-/3 each, 2/6 dozen.					
P.	Screws for bottom of Camera	-/4	-/6	-/6	-/9	-/9	-/9
Q.	T-Screws for Stands	-/6	-/8	-/8	1/-	1/-	1/-
R.	Ears for Stands, per set of 6	-/4½	-/6	-/9	1/-	1/-	1/4
RR.	Bearings for Pinions, per pair... ...	-/4	-/4	-/5	-/5	-/5	-/5

TT

CAMERA FITTINGS (continued).

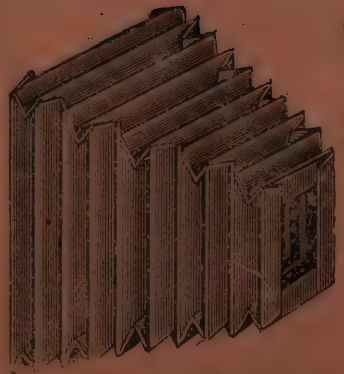
		¼	½	¾	10×8	12×10	15×12
S.	Bushes for Screws, each	-/1 ...	-/1 ...	-/2 ...	-/2 ...	-/2 ..	-/2
SS.	Milled Heads for Extension Rods ...	-/4 ...	-/4 ...	-/5 ...	-/5 ...	-/6 ...	-/6
	,, ,, with Rods complete ...	-/8 ...	-/8 ...	-/10 ..	-/10 ...	1/- ...	1/-
T.	Bolt and Milled Nut	-/10 ...	1/- ...	1/- ...	1/3 ...	1/3 ...	1/6
U.	T-Bushes for Cameras, each	-/2 ...	-/2 ...	-/2 ...	-/3 ...	-/3 ...	-/3
V.	Screws for Stands, set of 3	1/- ...	1/3 ...	1/6 ...	1/6 ...	1/9 ...	2/-
W.	Straps for Focussing Frame, set of 4 ...	-/2 ...	-/3 ...	-/4 ...	-/4 ...	-/4 ...	-/4
X.	Double Hinges for Focussing Frame, pr.	-/3 ...	-/3 ...	-/4 ...	-/4 ...	-/6 ...	-/6
Y.	Toe Caps all in one piece (3)	-/3 ...	-/4 ...	-/4 ...	-/6 ...	-/6 ...	-/9
Z.	Hinges for Dark Slides, &c., per pair ...	-/2 ...	-/3 ...	-/4 ...	-/4 ...	-/6 ...	-/6
A¹.	Corner Plates for Revers'g Bk., &c., pr.	-/3 ...	-/4 ...	-/4 ...	-/6 ...	-/6 ...	-/6
B¹.	Corner Plates for Slides, &c., per pair...	-/2 ...	-/2 ...	-/3 ...	-/3 ...	-/4 ...	-/4
C¹.	Angle Plates for Revers'g Bk., &c., pr.	-/2 ...	-/2 ...	-/3 ...	-/3 ...	-/4 ...	—TT



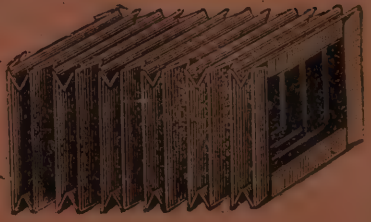
1. Circular Tripod Heads, 3/6 each.
2. ,, ,, for Recessing, 4½in., 3/-; 5in., 3/6; 5¾in., 4/-
   Rings, 4½in., 1/4; 5in., 1/9; 5¾in., 2/6.
3. Triangle for Tripod, ¼, 2/6; ½, 3/-; ¾, 4/-
4. Double Hinge for Focussing Screen, Polished and Lacquered, per pair, 1/-
5. Brass Washers, 6d. dozen.
6. Large, strong Turn Buttons, ¾-inch, 1d. each; 9d. dozen.
7. Large Strong Turn Buttons, ⅝-inch, 1d. each; 6d. dozen.
8. Slotted Plates for Swing Back, 2d. each; finished, 4d.
9. Ditto, for Rising Front, 2d. each; finished, 4d.
10. Guide Plates for travelling part of Camera, 9d. each.
11. Spring Catch, 1/-
12. Solid Grooving for Slides, 4d. per foot.
13. Leather Handle and Brass Fittings, 6d. set.
14. Tripod Screw, with T or Circular Receiver, 1/-
15. Iron Toe Caps for Tripod Legs, set of three, 6d. TT
16. Grooving for Double Slides, ¼, 8d. foot;
17. Screw Pin for holding down Shutter of Slide, 1/- dozen.
18. Brass Hook for Box, &c., 1d. each; 9d. dozen.
20. Flanges for R.R. Lenses, ¼, 2/-; ½, 3/-; ¾, 4/-
21. Springs for Printing Frames, per pair, ¼, 3d.; ½, 4d.; ¾, 6d.; 1, 8d.; 1¼, 1/-

'APTUS' CAMERA BELLOWS

(TO ORDER).



State when Ordering if Parallel or Taper.



Postage Extra.

Full Catalogue of Brasswork, post free.

Suitable for Camera:	Length Extended.	Square, Outside.	Oblong, Outside.	Best Varnished Maroon Leather Square.	Best Varnished Maroon Leather Oblong	Unvarnished Leather. Square.	Unvarnished Leather. Oblong	Twill. Square.	Twill. Oblong
Quarter-Plate	7 inch.	4¾ × 4¾	4¾ × 3¾	3/0	2/8	2/10	2/6	2/3	2/0
5×4	9 ,,	5½ × 5½	5½ × 4½	3/8	3/3	3/6	3/0	2/9	2/6
Half-Plate	12 ,,	7¼ × 7¼	7¼ × 5½	6/9	6/3	6/3	5/9	3/9	3/6
Ditto	14 ,,	7⅞ × 7⅞	7⅞ × 5⅝	7/3	6/9	6/6	6/0	4/3	3/9
Whole-Plate	18 ,,	8¼ × 8¼	8¼ × 6½	10/6	9/6	9/0	8/6	6/0	5/6
Ditto	20 ,,	9⅝ × 9⅝	9⅝ × 7⅝	13/0	11/0	10/6	9/9	7/6	6/6
10×8	22 ,,	11⅜ × 11⅜	11⅜ × 9⅜	15/0	13/6	12/6	11/9	10/6	9/0
12×10	24 ,,	13 × 13	13 × 11	17/6	15/6	14/6	13/6	13/0	11/6
15×12	30 ,,	16 × 16	16 × 13	24/0	22/0	20/0	19/0	18/0	16/6

In Ordering please state if Taper or Parallel Bellows is required.

N.B.—Figures in third and fourth columns represent the outside measurement of Bellows when closed.

SHARP & HITCHMOUGH, LIVERPOOL.

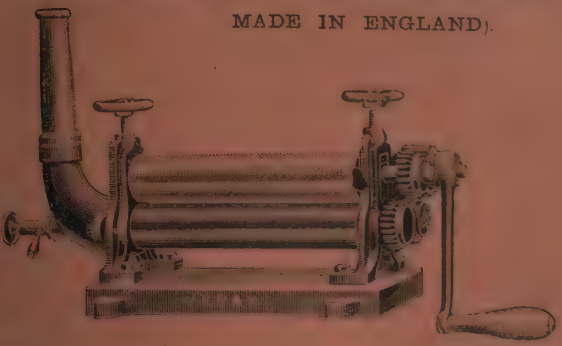
Telegrams:—'Aptus Fitter,' Liverpool. Telephone No. 2436.

The 'VERAX'

Rotary Enameller

MADE IN ENGLAND).

DUPLEX MODEL.



The Top Roller is of Solid Steel, nickel-plated; it is lightly milled so as to get a good grip of the card.

The bottom roller is of the Best Solid Drawn Steel, and is nickel-plated and highly polished.

The framework is all nickel-plated, and the gearing is machine cut so as to ensure easy and quiet running. The driving wheel on the handle is of gun metal. The pressure on the rollers is regulated by a hand-wheel at each end, so arranged that, after the card has gone through, the rollers they do not come in contact with each other, thus preserving their high polish.

The bottom roller is hollow, and is heated *internally* by our improved burner or spirit lamp. The face of the roller is always clean and free from moisture.

The machines are either Duplex or Quadruplex Geared. The Quadruplex Gear ensures easy and regular running.

These Burnishers are strong, well finished, and for practical working are fully equal to any machine on the market. Every machine is tested before leaving the works.

NET PRICES. TT

With Gas Burner or Spirit Lamp.			Extra for Strong Brass Spirit Lamp.	With Gas Burner or Spirit Lamp.			Extra for Strong Brass Spirit Lamp.
Size: Length of Rollers.	Duplex Gear.	Quadruplex Gear.		Size: Length of Rollers.	Duplex Gear.	Quadruplex Gear.	
Inches.	£ s. d.	£ s. d.	£ s. d.	Inches.	£ s. d.	£ s. d.	£ s. d.
6	1 6 6	1 16 0	0 4 6	12	—	4 [illegible]	[illegible]
8	2 0 0	2 18 0	0 5 0	15	—	[illegible]	[illegible]
10	3 0 0	3 12 0	0 5 6	20	—	[illegible]	[illegible]

If Spirit Lamp instead of Gas Burner, please state also if the Extra Strong Lamp is required. The Machines are always supplied with Gas Burner unless otherwise ordered.

CARRIAGE FORWARD. CASES AND PACKING EXTRA.

SHARP & HITCHMOUGH, LIVERPOOL.

POSITIVE STOCK.

FERROTYPE PLATES.

'Special' Buffalo, 14×10, Black or Chocolate, per doz. 4s.; per box of 200 Sheets, £2 2s. half-box, £1 2s.; quarter do., 13s. 6d.

AMERICAN CUT-UP FERROTYPE PLATES.

Per box of 8 dozen, Black or Chocolate, 3½×2½, 2s. 10d.; 4½×3½, 4s. 3d. per box.

GLASS.

	Per gross.	
⅛ size (2½×2) ..	0s. 10d. ..	1s. 0d.
¼ ,, (3¼×2¾) ..	2s. 0d. ..	2s. 6d.
½ ,, (4¼×3¼) ..	3s. 6d. ..	4s. 6d.

MATS AND PRESERVERS.

	Per gross.	½ Gross.	Per doz.
⅛ size (2½×2) ..	3s. 0d.	1s. 6d.	0s. 3d.
¼ ,, (3¼×2¾) ..	3s. 10d.	2s. 0d.	0s. 5d.
½ ,, (4¼×3¼) ..	6s. 11d.	3s. 6d.	0s. 8d.

CASES.

	Doz.
⅛ size (2½×2)	1s. 6d.
¼ ,, (3¼×2¾)	2s. 0d.
½ ,, (4¼×3¼)	4s. 6d.

TRAYS.

	Gross.	Doz.
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Special Quotations for large orders of Envelopes and Positive Glass.



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'Aptus' Hand-Camera



MADE
IN ENGLAND.

For 12 Plates or
24 Films in Sheaths



PRICE
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JENA GLASS ACHROMATIC LENS.

Iris Diaph. working at very large aperture. Case Handsomely Covered. Automatic Counting Indicator. Two Finders for Vertical and Horizontal Pictures. 12 Sheaths for Films or Plates with each Camera. Time and Instantaneous Shutter. Weight, 2¼ pounds. Size, only 8×6¾×4 inches. So Simple and yet so Perfect. Marvellous Value. Best Workmanship. Finished Appearance. Acknowledged by all to be the Cheapest and Best Camera ever produced for the money.



The Editor of the BRITISH JOURNAL *writes: July 2nd*, 1897.

definition is so conspicuous that the camera could not have a better testimonial to its efficiency.'



Reprinted from the WHARFEDALE AND AIREDALE FREE PRESS *of July 30th*, 1897:—'As to the work OBSERVER *and* ILKLEY it unstintingly: we recently did a long day's itself, we can praise work with it at Bolton Abbey, and the results are sharp, clear negatives, full of detail. We have done no better work with hand-cameras costing six times the money, for the price with the twelve plate sheaths is only 30*s*. We can strongly recommend any one in search of a really good hand-camera to see this and then acquire one confidently. Out of many we have put to the test, we can say that this is reliable, has a marvellously-effective lens. If we were intending purchasing a good reliable hand-camera at a remarkably low price, it would assuredly be the "Aptus."'



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SPECIMEN PICTURES POST FREE, 2d.

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Simplicity. Every one exact.

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Directions.

Lay the Binder on any smooth surface, and moisten it, place slide on to same where dotted lines are shown. WORMALD'S Mask is then put in position with the cover glass on top; take all up between the fingers of left hand. The over-lapping edge will now be found to fit exactly.

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'The accompanying negative is of some interest, owing to the fact that accidentally it received an exposure of 1-15 sec. with *f*/22 instead of 1/3 secs., as it should have received according to Wynne's exposure meter. The result speaks volumes for the latitude of speed allowed by your films.
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'I must say that after having tried many different brands of plates and films during the past eleven years, I was surprised and delighted to find the Setoloid Films so easy to handle with ordinary Pyro Soda Developer, and giving such satisfactory results.' 'Rev. M. C. W.'

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'I bought twenty-four ¼-Films of you on the 4th January last, and I used them for first time on the 22nd inst. The fact is, I'd got so wedded to *Plates*, I felt afraid to use Films. I am sure you will be surprised at my success. I exposed three dozen—*i.e.*, one dozen plates and your two dozen films. The whole of the plates (by good maker) were useless, but I got good negatives on every film Some are most beautiful; but being of the processions in our town during the Jubilee celebrations, I cannot spare them for your competition, so please send me four dozen Instantaneous Films (¼), as I mean to enter for your next competition, if I can find time and suitable subjects. 'J. T. M., Junr.'

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LIST WITH PLEASURE.

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Telegraphic Address: 'FILMS, LONDON.'

[*See following page*

Film Photography.

THE AUSTIN-EDWARDS' MONTHLY FILM NEGATIVE COMPETITION

A FRENA CAMERA

AWARDED EACH MONTH

In competition for the best Film Negative on an

AUSTIN-EDWARDS FILM

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Any size negative. Any subject. All unsuccessful negatives returned, and the Winner receives a New Frena Camera (Memo Size), loaded with 40 Setoloid Films.

CONDITIONS.

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2nd.—The Winning Negative and all Prints become the property of Messrs. Austin Edwards.

3rd.—The Prize Camera will be forwarded to winner on the 15th of each month, and the negatives entered for competition must have been taken during the preceding month, and be sent in before the 3rd of the month in which the award will be made.

Awards have been made on the 15th of each month since October, 1896.
Entry Forms free on application, or through any Dealer.

AUSTIN EDWARDS,

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[*See preceding page*

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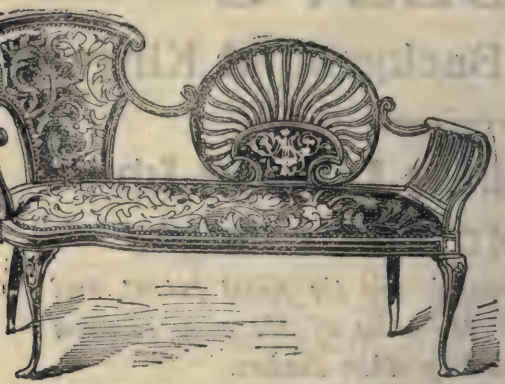
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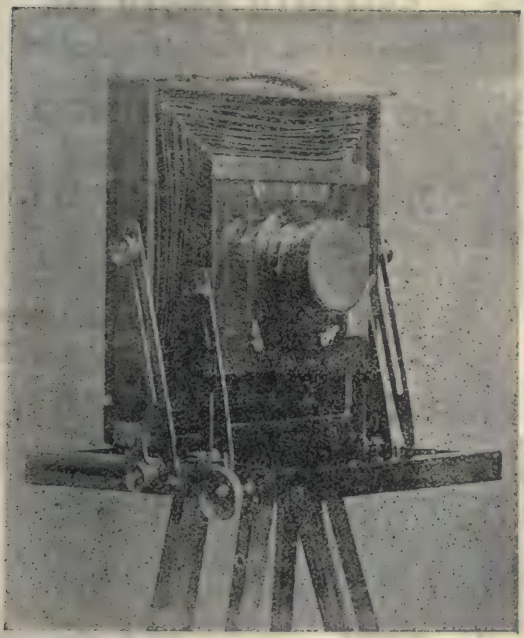


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The most wonderful Camera at the price in the world

See one, it will then speak for itself.

THIS Camera, most agreeably unlike many other cameras, possesses qualities of vital importance without entailing the slightest objectionable movement; even in the merest details it will bear the minutest inspection as to quality and finish, and we claim it to have no equal at anything like our price. It is made to meet the hands of everybody, as the price is so moderate that a second-rate instrument is not worth consideration.

We only ask that any one who is desirous of purchasing a camera will see ours and compare it with others. We will send it on approval and return cash if purchaser is not fully satisfied, with pleasure. This is no catch-penny toy, but is an instrument of the highest grade of workmanship throughout, and embraces the most novel ideas one could desire or suggest. At the price it is far ahead in every way of all others yet introduced.

The instrument folds into very small space, whilst it gives extreme extension, thus allowing the use of lenses up to 12 in. or 15 in. focus. It may also be used in any possible manner, allowing the base of the camera to be elevated either back or front, whilst the camera itself may be perfectly level, or tilted in any possible manner required.

It has the following improvements: double extension by means of rack and pinion ocussing, double swing front (both vertical and horizontal), rising and falling front, double swing and reversing back, sliding set-up motion for use of short-focus lenses, &c. When used for this latter purpose it will be seen that the front of the camera does not require to be fixed to the very front of baseboard to make it stationary, as this necessitates the trouble in all cases of sliding up the back portion of the camera, which is often very troublesome.

The Up-to-date Camera and three double slides, Rapid Rectilinear Lens of finest quality, with Iris diaphragms, finest quality three-fold Tripod Stand, solid leather Camera Case, with lock and key, either oblong or square pattern:

6½ × 4½	8½ × 6½	10 × 8	12 × 10	15 × 12
£9 3 6	£12 0 6	£15 6 0	£18 2 6	£23 2 6

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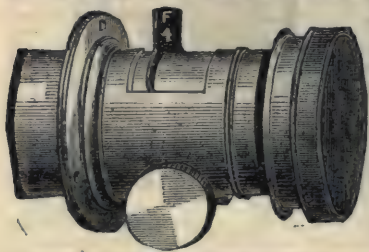
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Comprising Mahogany and Leather Bellows Camera—all latest Improvements. Rectilinear Lens with Iris Diaphragms, 3-fold Ash Sliding Stand, and Thornton-Pickard Instantaneous Shutter, Wide Angle Movement.

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5×4 and ½ Plate ...	4¾ in. ...	1 1/16 ...	20/0
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Wide-Angle Rectilinear Lenses.

¼ Plate	2⅜ in. focus		25/0
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10×8	7 1/16 ,, ,, ...		60/0
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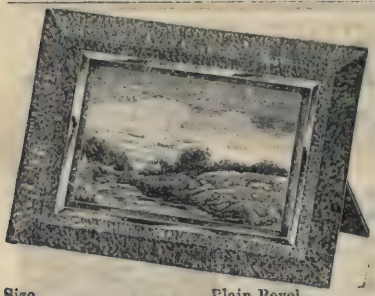
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Size.	Plain Bevel.		¼ Gilt Bevel.		½ Gilt Bevel.	
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11½×9½	6/6	72/-	—	—	—	—

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	doz.	each.	doz.	each.	doz.	each.	doz.	each.
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Catalogues ... ... 3 stamps.

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BERLIN BRISTOL MOUNTS, beautiful design on back, C.-D.-V., 1s. 6d.; Cabinet, 3s. 100; New Grey Bristol, white bevel-edge mounts, C.-D.-V., 1s. 6d.; Cabinet, 3s.; Printing name and address, 1s. 100 extra.

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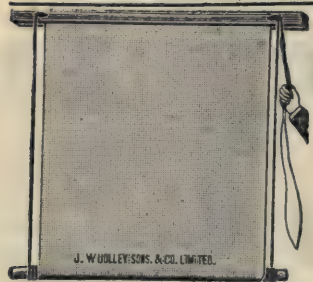
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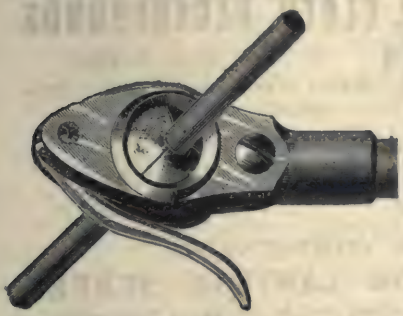
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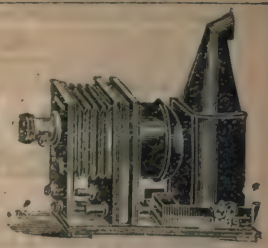


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[*See pages* 496, 1333, 1334, *following pages, also cover.*

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CASTLE PLATE

Manufactured by MAWSON & SWAN.

MAY be looked upon as the regular Working Plate of the Professional Photographer.

It is a considerably quicker Plate than the average Plate used in the Portrait Studio. In fact, it is quite as quick as for nine-tenths of studio work a plate ought, all things considered, to be, and is of the degree of sensitiveness found most useful and convenient for GENERAL WORK, and such as permits of all the other essential qualities of a good plate being fully retained.

To sum up, the CASTLE Plate is par excellence THE PLATE FOR EVERY-DAY WORK, whether in the Studio or the Field.

MAWSON & SWAN,

33 SOHO SQ., LONDON, & NEWCASTLE-ON-TYNE.

Important to COLONIAL BUYERS.

From the 'PHOTOGRAPHISCHES ARCHIV,'
No. 792. *June* 1896.

'PHOTOGRAPHY IN THE TROPICS.

'One of our Readers, MR. S. VERWEY, Engineer to the Dutch-Indian State Railways, sends us the following interesting communication.

'HEREWITH I send you print of a Photograph of a Crocodile. The Plate was a '**CASTLE ORDINARY**,' developed with ferrous oxalate. As we are constantly hearing complaints of the packing of plates sent to the Tropics, and of the difficulties of development there, it may be useful and desirable to give you some of my own experiences.

'At the beginning of 1892 I received a large shipment of 'CASTLE' Plates from Amsterdam. The case was examined by the customs in Batavia, and the tin covering one of the plate boxes was perforated. The box was crushed but still light tight. Of course, I did not remove the tin, and I put the box of plates on one side, thinking they were spoiled by damp.

'Curiously, this box was dragged about with my other apparatus for a period of four years. During this time it was exposed to the moisture of Preanzerland, the great heat of Soraboya, then went to the Mountains where a night temperature of 60 to 65° Fahrenheit prevails, and at last was brought to my present station in the swamps of Maos. Consequently, it had gone through four years of heat, cold, and damp. In March, 1896, I had used up all my 13×18 cm. plates, and could not obtain any others. From necessity I had to use the Plates to which I have referred, but did not expect much of the results. From the enclosed print you will see they were not faultless, but still very useable.

'For the past six years I have developed with ordinary ferrous oxalate 1:3 and have been very seldom troubled with fog or other mishaps. With Rodinal, Amidol, Hydroquinone, and Pyrogallol fog is frequently met with in making studies, especially with rapid plates.

'With ordinary "CASTLE" Plates, developed with ferrous oxalate, negatives free from fog may be had with short exposure. In addition it is necessary to use Bromide of Potassium freely.

'The enclosed photograph was taken at half past six in the morning, stop f/40 and exposure 1½ seconds.

'Portraits at 7 a.m. and 7 p.m., with f/9 to f/13 are exceedingly fine, soft, and full of detail, and the exposure is about 4 seconds.'

MAWSON & SWAN,
NEWCASTLE-ON-TYNE, ENGLAND.

— THE —

MAWSON

PLATE

REGISTERED



TRADE MARK.

RENOWNED FOR . .

MARVELLOUS SENSITIVENESS,

Yet retaining all the Good Qualities requisite for the production of

A Perfect Negative.

Manufactured by

MAWSON & SWAN,

MOSLEY STREET,

NEWCASTLE-ON-TYNE.

London Depot:—
33 SOHO SQUARE, W.

. . . *THE* . . .

Good Keeping Qualities

of Mawson & Swan's Dry Plates are well known, and testimonials from various quarters of the globe certifying to this, have been published from time to time for years past. We append another testimonial recently to hand, proving the EXCEPTIONALLY GOOD KEEPING QUALITIES of the

Mawson Plate

'I have had two one-dozen packets of these plates packed away in a cupboard for over six years, and I concluded they would be useless. However, I exposed one dozen on July 13th in one of Turnbull's hand cameras, working with *f*|16 and *f*|22 aperture and with a rapid shutter, and to my great surprise got some splendid little views on the River Dee.

'I exposed the other dozen on July 14th, and every plate has produced a beautiful pearly negative. Out of the 24 plates I had only one failure, and that was owing to a slight hitch with the shutter. I showed them to my brother, who is a professional photographer, and he is delighted with them, and intends to send you an order shortly.

'CHESTER, *July 12th*, 1897. (Signed) 'H. A.'

MAWSON & SWAN,

Soho Square, London; and Newcastle-on-Tyne.

THE ELECTRIC PLATE.

THIS is MAWSON & SWAN'S Special Rapid Portrait Plate. The **ELECTRIC** has all the chief characteristics of the **CASTLE** Plate, but it is quicker than the **CASTLE.**

We do not say this Plate is better than the **CASTLE,** no Plate can be better, but it is, as above stated, quicker than it, and will be found very useful where there is actual necessity for using a quicker Plate than the **CASTLE.**

The **ELECTRIC** is sold at the same price as the **CASTLE,** and is particularly well suited for Groups and Portraits.

Proof THE SALES HAVE INCREASED BY LEAPS AND BOUNDS SINCE ITS INTRODUCTION.

FOR . .

PROCESS WORKERS.

THE MAWSON
PHOTO-MECHANICAL PLATES

For rendering line subjects with perfect density in the deposit and clearness in the lines they will be found to yield perfect results.

THE MAWSON
HALF-TONE PLATES

Recently introduced to meet a demand for Plates specially suited for Half-tone work, and give universal satisfaction.

MAWSON & SWAN,

33 Soho Square, LONDON,

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MAWSON & SWAN'S
ORTHOCHROMATISED
DRY PLATES.

From BLUE to RED.

IMPORTANT TESTIMONY.

Mawson & Swan's Orthochromatised Plates.

ORTHOCHROMATIC Photography should command increased attention now that so many firms are taking up the manufacture of colour-sensitive plates, and it may be safely conjectured that the productions of Messrs. Mawson & Swan in this particular field will speedily achieve a degree of favour not inferior to that enjoyed by their other specialities. We have had the opportunity of trying some of their recently introduced orthochromatised plates. The subject we chose was a coloured picture prepared as a test object with special inks, and the resulting negatives proved that *the plates possessed the property of correctly translating colour values to a remarkable degree, the reds in particular being well rendered.* We congratulate Messrs. Mawson & Swan on their latest introduction.

From the 'British Journal of Photography,' July 2nd, 1897.

MAWSON & SWAN,

Manufacturers,

33 SOHO SQUARE, LONDON,
and NEWCASTLE-ON-TYNE.

* * FILMS. * *

Flat Films on Celluloid

THE MAWSON FILMS

MOST RAPID IN THE WORLD.

THE CASTLE FILMS

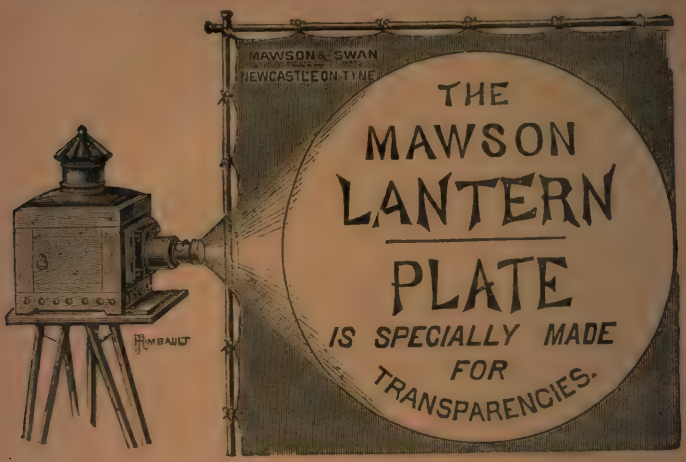
FOR GENERAL WORK.

THE ABOVE FILMS have been extensively supplied to several of the Largest Publishing Firms during the past year, and can be confidently recommended.

CAN BE OBTAINED FROM ALL DEALERS OR FROM THE MANUFACTURERS,

MAWSON & SWAN,

LONDON & NEWCASTLE-ON-TYNE.



THE MAWSON LANTERN PLATE is a slow plate for the production of Transparencies, it is free from grain, so that any reasonable magnification can be made. It gives perfect photographic gradation from clear glass to opacity—and yields any variety of tone. It is a perfect plate for a special purpose, and slides made with it are quite equal to those made with Collodion.

N.B.—We shall be pleased to send a pamphlet 'How to make Transparencies,' giving clear and concise instructions—post free on application.

MAWSON & SWAN,

33 SOHO SQUARE, LONDON,

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MOSLEY STREET, NEWCASTLE-ON-TYNE.

Heaps of Prizes have been won on

The MAWSON Lantern Plate,

Styled by the late Editor of *The British Journal of Photography*, J. TRAILL TAYLOR, Esq., as

'THE BEAU IDEAL of a Lantern and Transparency Plate.'

Gives BLACK, BROWN, RED, or BLUE TONES.

Recognised all the world over as

THE BEST.

Now Ready.—A Revised Edition of our Pamphlet,

'HOW TO MAKE TRANSPARENCIES AND LANTERN SLIDES.'

COPIES FREE BY POST ON APPLICATION.

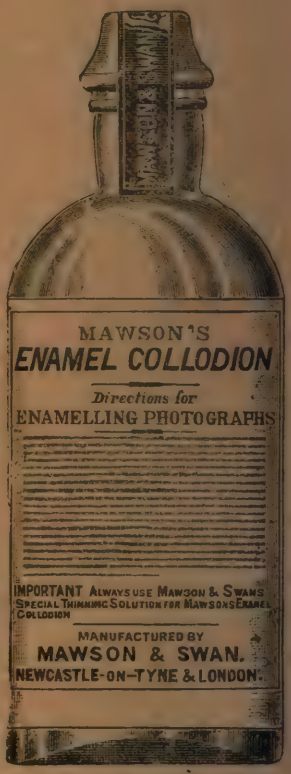
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STANDARD COLLODION
For ENAMELLING.

AVOID
Inferior
Preparations.

ASK FOR
MAWSON
AND
SWAN'S
MANUFACTURE,
And see that you get it.



IMPORTANT.

Each Bottle of Collodion has our Registered Label over the Cork or Stopper.

All the Principal Enamellers use it.

STANDARD

NEGATIVE COLLODION.



CAUTION.—It is very important to see that each bottle of Collodion and Iodizer bears our Label over the Cork or Stopper.

MAWSON & SWAN'S

Standard . .

. . Collodions

ARE

THE BEST

FOR

PROCESS WORK.

NO effort is spared to maintain the high standard of excellence which has been secured for our Collodions. They are the Oldest Established, and have by their superiority maintained the first place in the estimation of Professional Photographers all the world over.

They are largely used by the Principal Workers of the Photo-Mechanical Processes, and specially recommended by the Leading Experts.

ANTALO



IS A QUICK-DRYING

Backing Composition

FOR DRY PLATES,

TO PREVENT HALATION.

It dries hard in a few minutes, is opaque, and is easily removed with a damp sponge.

In Bottles, 9d. each; or by post, 1/3

Can be had from Dealers or the Manufacturers,

MAWSON & SWAN,

33 SOHO SQUARE, LONDON, and

NEWCASTLE-ON-TYNE.

[*See preceding and following pages, also cover.*

MAWSON & SWAN'S
Photographic = = = = Varnishes

ARE SUPERIOR TO ANY OTHER.

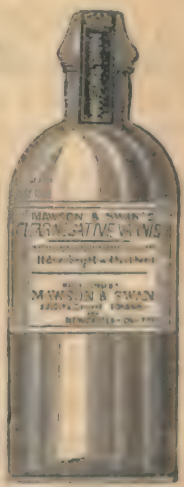


Extra Hard. Has stood the test of 40 years' use.

Dry Plate.
None better for Gelatine Dry Plates.

Clear Negative.
Dries without heat.
PRICES:—W. Qt., 9/-; Pints, 2/6; Half-pints, 1/4; Btls., 1/- and 6d. Also 2 gal. tins, 30/- each.

Varnish.
For Positives, Opals, &c.
In Bottles, 1/-



They are specially manufactured from the best materials, and have been extensively used for many years by leading photographers. They are always uniform and thoroughly reliable.

Manufactured by

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London Depot:—
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MMM

[*See page 496, preceding and following pages, also cover*

Developing Cartridge.

• •

ONE SOLUTION.

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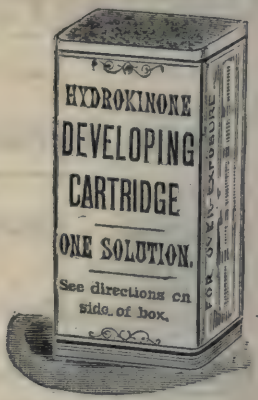
Dissolve the contents of this Bottle in four ounces of water.

This solution may be used more than once.

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PER DOZEN CARTRIDGES,

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FINEST QUALITY

FIXING CARTRIDGE



Suitable for Negatives or Silver Prints.

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Dissolve this quantity in ten ounces of water.

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MAWSON & SWAN, LONDON and NEWCASTLE-ON-TYNE.

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COLLODIO-CHLORIDE. A splendidly vigorous, tough, rapid permanent paper. As easy to work as Albumen, but more rapid, more detail, more permanence. No blistering, no smudging, drys rapidly, and guaranteed not to curl, crack, or peel.

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OWING to the early date at which this ALMANAC goes to press, and to the fact that we have in preparation some remarkable novelties, which will be first introduced at the Great International Photographic Exhibition to be held at the Crystal Palace early in the spring, and which are at the time of writing not in a sufficiently forward state to advertise particulars, we are not issuing our usual sixty-four pages advertisement in this volume this year. For particulars of general goods please refer to the 1897 edition of this ALMANAC. Also post us nine *1d.* stamps for our Grand Exhibition Catalogue of over 400 pages and 800 illustrations, ready early in the spring, and which will contain very full particulars of one or two really remarkable novelties.

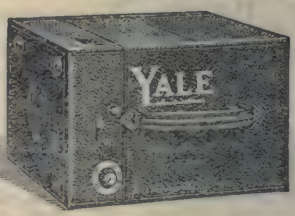
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Some startlingly new departures for 1898. Full particulars will be issued early in the year. Send nine stamps for 400 pages catalogue.

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Less Ten per Cent. cash discount.



LENS.—A really good high-class rapid rectilinear working to *f*/8, and fitted with Iris diaphragms.

SHUTTER.—A new metal shutter of high efficiency, working at various speeds from $\frac{1}{8}$ to $\frac{1}{100}$ of a second, as well as ordinary time exposures.

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PLATES.—Takes twelve plates or twenty-four films, $4\frac{1}{4} \times 3\frac{1}{4}$. Film Sheaths, 3*s.* per doz. extra.

CHANGING.—The famous YALE infallible system, or double backs.

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Can be fitted to tripod both ways.

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British Journal of Photography says:—'Of *great excellence.* Changing method is one of the *simplest* as it appears one of the most *certain* yet devised.'

The Amateur Photographer says:—'It is *thoroughly good value.*'

The Photographic News says:—'Extremely *simple.* The changing system is *simplicity and perfection itself.*'

Nothing approaching its value has ever appeared before.

25/- only.



LENS.—A first-class Achromatic Meniscus.

SHUTTER.—Is EVER-SET, self-capping, gives time as well as instantaneous exposures, and is regulated for VARIOUS SPEEDS.

FINDERS.—Two, showing a BRILLIANT image.

PLATES. — Takes 12 in. Sheaths. These will also take twelve Films. Or Camera can be supplied to take twenty-four Film Sheaths, at 3/- extra.

CHANGING.—The famous YALE infallible system.

40/-



Takes pictures 4¼ × 3¼, and holds either twelve plates or twenty-four films. Hood is our registered design. The advantages are, that being long and funnel-shaped, and enclosed all the way round, the picture can be distinctly seen out of doors. No other camera possesses this unique advantage, as whilst they appear all right when viewed in a shop or doorway, or any position where they are shielded from back light, the picture is practically invisible when in ordinary use. A FULL-SIZED picture is seen.

LENSES.—A pair of first-class Achromatic Meniscus Lenses.

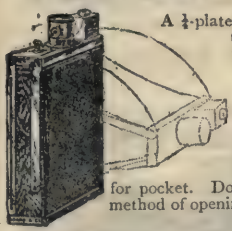
SHUTTER. — Is EVER-SET, self-capping, gives time as well as instantaneous exposures, and is regulated for VARIOUS SPEEDS.

FINDER. — Full-sized image, perfectly distinct under all conditions.

PLATES. — Takes 12-in. Sheaths. These will also take twelve Films. Camera can also be supplied to take twenty-four Film Sheaths at 3/- extra. **CHANGING.**—The famous YALE infalliible.

See preceding and following pages.

'VESTA' HAND CAMERA.



A ¼-plate Hand Camera that goes into the Pocket.

Fig. 2.—Closed for pocket. Dotted lines show method of opening.



Fig. 3.—Open for use.

The British Journal of Photography says: 'A unique camera—we cannot easily see where any further improvement can be made.'

The Amateur Photographer says: 'A marvel of ingenuity and skill, and is the lightest camera we have handled. Is a little gem.'

1. **LENS.**—Goerz, with Iris Diaphragms.
2. **SHUTTER.**—Specially designed, all metal, Patent Pneumatic Regulation. Exposures varying from $\frac{1}{100}$ to 1 second; also time exposures.
3. **SETTING CAMERA.**—Pull lens forward—THAT'S ALL!!
4. **ADAM'S BRILLIANT FINDER.**—For vertical and horizontal.
5. **DARK SLIDES.**—Takes plates or films. Draw-out shutters.
6. **THE ADAM'S CHANGING BOX.**—Takes 6 plates or 12 films. A capital combination, and has in our hands (says *Photography*) worked without a hitch.
7. **FOCUSSING SCREEN.**
8. **SWING BACK.**—Measures, when closed, about 7½×4½×1½ in. and weighs about 20 oz. Can be used on tripod both ways.

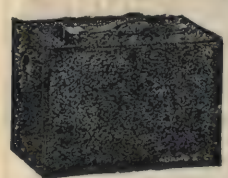
Complete with Three Double Dark Slides, and Goerz Lens, £10 10s. Changing Box, 15s. extra. If with Wray Lens, £8 10s.

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THE SIMPLEST AND HANDIEST OF ALL HAND CAMERAS.

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Takes 12 Plates or Films, 4¼ × 3¼.

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PRICES.

No. 1.—Best 'IDEAL' Rapid Rectilinear Lens	£5 5 0
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Stiff Waterproof Cases, lined with baize, and with shoulder straps, and fitted with lock and key, 15/- each; Best quality, Solid Leather, ditto, 21/-; Morocco and Calf-lined, 17/6. Waterproof Overalls, which can be taken off and carried in pockets, 4s. 6d. each.

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Still the only PERFECT *Finder.*

N.B.—Several show a brilliant picture, but NO OTHER shows the same amount of view as the lens gives upon the plate. DO NOT FORGET THIS. Consequently it is the only perfect one.

The 'ADAMS' BRILLIANT VIEW FINDER



(Triple Convex Lens System, Patent)

Still holds premier position. Owing to its great success we have had to put up with the flattering tribute of imitation IN OUTWARD FORM. The similarity, however, is MERELY in style and appearance.

No other Finder even approaches it.

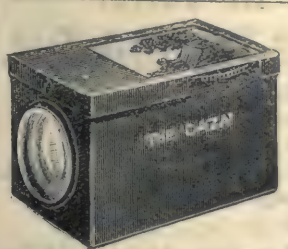
It is absolutely UNIQUE in conception, and PERFECT in result.

It shows a REAL and TRUE image, and truthfully records the picture obtained upon the plate. None of the various IMITATIONS of the Patent do this. Whatever Hand Camera you order, INSIST upon them being fitted. Can be fitted to old Cameras.

'AE' pattern shows 2 views, horizontal and vertical
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Size.		Size of View seen.		Pattern. AE.		BE.	
No. 1.	.....	$\frac{1}{2} \times \frac{1}{3}$	...	10/6	...	7/6	each.
" 2.	.....	$\frac{1}{2} \times \frac{1}{4}$	...	13/6	...	12/-	"
" 2.	In Aluminium	.....	...	15/6	...	14/-	"
" 3.	.....	$1\frac{1}{4} \times \frac{1}{3}$	...	17/6	...	15/-	"
" 3.	In Aluminium	.....	...	20/-	...	17/6	"

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THE DĀZA Brilliant — View Finder.

A MODIFICATION of our famous 'ADAMS.' Image appears absolutely upon the surface of the glass, and a flat special mirror being used, there is no unpleasant distortion of image. The revolving wheel, of which **WE WERE THE ORIGINATORS AND DESIGNERS**, gives vertical or horizontal view. For those who do not care to go to the expense of the 'ADAMS,' and who do not require the **most perfect article**, we strongly recommend the above. It is far superior to all imitations.

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[*See preceding page.*

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THE MOST PERFECT ON THE MARKET.

May be used either in the hand or on a stand.

Has Focussing Screen, Sheaths, Roll-holder, Goerz or Zeiss Lens, Central Shutter working between the Lenses.

THE VADE-MECUM POCKET CAMERA (L. V. N.).

RECOMMENDED to ENGINEERS, ARCHITECTS, &c.

Dimensions, 14 × 16 × 4 centimetres.

Plane focal Shutter of variable speeds, fixed Focus Lens, Iris Diaphragms.

LE KLAPDORP HAND CAMERA.

Carrying twelve Plates, which are automatically charged, **£3.**

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The Lens serves as a Finder while focussing, Shutter of variable speed.

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An apparatus for either Reducing or Enlarging all or any part of the subject.

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MANUFACTURERS OF PHOTOGRAPHIC LENSES, CAMERAS, &c. 8 & 10 RUE DE MALTE, PARIS.

ANASTIGMAT. SERIES 1, F/7, ANGLE OF VIEW ABOUT 80°, IRIS DIAPHRAGM, JENA GLASS.

THIS Lens is perfectly corrected for the chemical focus, that is to say that the optical and visual images are absolutely coincident. Its advantages are the following:—

The angle of field attains 80°, in consequence of which it will cover a plate of a size larger than for which it is listed.

At full aperture perfect sharpness is obtained over the complete surface of the plate. The sharpness at the angles attained is one-tenth of a millimeter (type of sharpness adopted by the laboratory of THE SOCIETE FRANCAISE DE PHOTOGRAPHIE). Its focal volume is uniform for the whole surface of field.

The best rectilinear lenses of the old construction must be stopped down to *f*/16 to obtain the same crispness; consequently, for an equal surface sharp covered, these new lenses are four times more rapid.

These lenses can be assimilated, by the results obtained, with those of the best English and German makes so much in vogue amongst amateurs.

Instantaneous pictures can be made by them, at any season, of admirable crispness. They may be used for all classes of work: portraits and groups, landscapes and copying. Their focal lengths have been calculated so as to avoid all defects in perspective. The focal point does not vary with the change of diaphragm.

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1A	7 „	6½×4¼	7 ×5	8½× 6½	5 12 0
2	7½ „	7 ×5	8½×6½	9 × 7	6 8 0
3	10½ „	9 ×7	10 ×8	12 ×10	9 0 0
4	12 „	10 ×8	12 ×10	14 ×11	11 0 0
5	14 „	12 ×10	14 ×11	15 ×12	14 8 0

[*See following pages.*

FRANCE.



No. 3.

EAGLE COMBINATION LENSES.

Iris Diaphragm, in Morocco Case, Velvet Lined.

No. 1. 6½×4½, 4 lenses, 6 combinations £4
Rapid Rectilinear ... ... Focus, 7½ in., F/8
Rapid Mid-angle ... ... ,, 6½ in., F/11
Wide-angle ... ... ,, 4½ in., F/16
Landscape ... ... ,, 9, 11, & 15 in.

No. 2. 8½×6½, 4 lenses, 6 combinations £6
Rapid Rectilinear ... ... Focus 10 in., F/8
Rapid Mid-angle ... ... ,, 8½ in., F/11
Wide-angle ... ... ,, 6½ in., F/16
Landscape ... ... ,, 12, 14, & 20 in.

No. 3. 10×8, 6 lenses, 8 combinations £9
Rapid Rectilinear ... ... Focus 12 in., F/8
Rapid Mid-angle ... ... ,, 10 in., F/11
Wide-angle ... ... ,, 8 in., F/16
Extreme Angle ... ... ,, 6 in., F/20
Landscape ... ... ,, 12, 16, 18, 24 in.

CLEMENT & GILMER'S RAPID SYMMETRICAL,

F/8. A rapid Aplanatic Lens, perfectly corrected.

Back Focus	5½-in. 5×4 £ s. d.	6½-in. 6×5 £ s. d.	7½-in. 7×5 £ s. d.	10-in. 8½×6½ £ s. d.	11½-in. 10×8 £ s. d.	14-in. 12×10 £ s. d.	18-in. 15×12 £ s. d.	22-in. 20×16 £ s. d.
In brass settings, with Waterhouse diaph.	1 16 0	2 0 0	2 8 0	3 0 0	3 12 0	4 16 0	6 8 0	10 0 0
Same with Iris diaph. ..	2 4 0	2 8 0	2 16 0	3 12 0	4 4 0	5 12 0	7 4 0	11 0 0
Oxidised Aluminium, Iris diaphragms ...	2 12 10	2 17 8	3 7 8	4 6 5	5 0 10	6 14 6	8 12 10	13 4 0

CLEMENT & GILMER'S RAPID EURYSCOPE, F/6,

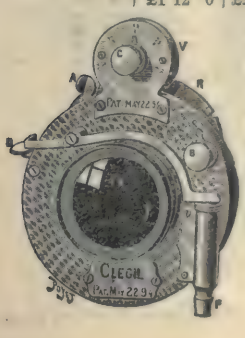
Jena Glass. A Rectilinear Portrait Lens for Studio, and quickest working lens for Landscapes and Groups.

Back Focus	5½-in. 5×4	7-in. 7×5	10½ in. 9×7	11½-in. 10×8	15-in. 12×10	17½-in. 15×12
In brass mounts	£2 17 0	£4 5 0	£5 0 0	£5 14 0	£8 0 0	£12 0 0
Oxidised aluminium mounts	3 8 5	5 2 0	6 0 0	6 16 10	9 0 0	13 4 0

CLEMENT & GILMER'S Extreme Angle Panoramic, F/16.

Double Combination, embracing from 100 to 110°. Specially recommended for Architectural Subjects, Interiors, and Panoramic Views.

Back Focus ...	4½-in. 7×5	6-in. 9×7	8-in. 12×10	10-in. 14×11	12-in. 16×12	14-in. 18×14	medium stop.
	£1 12 0	£2 8 0	£3 4 0	£4 0 0	£5 4 0	£6 0 0	



'HAND CAMERA LENSES

WITH SHUTTERS.'

The "Clegil Central Shutter" with iris diaphragm for time and instantaneous exposures, works at graduated speeds from $\frac{1}{15}$ to $\frac{1}{150}$ of a second; for variation, an indicator and dial are provided. Both finger and pneumatic release and capped setting complete this perfect shutter.

SHUTTERS—	PLATE	½	¼
For Rectilinear Lenses		24/-	28/-
Fitted with the Panorthoscopic Lens		56/-	70/-
,, ,, ,, American Star R.R. Lens ...		44/-	56/-
,, ,, Clement & Gilmer's Anastigmat F/7	10½"	120/-	140/-

[*See preceding and following pages.*

FRANCE.

'THE PANORTHOSCOPIC LENS'

Applied to long distance Photography.



THIS Tele-Objective Panorthoscopic is suited to all amateur cameras, instantaneous pictures of far distant objects (often inaccessible) can be made by it, with perfect straight lines, remarkable depth and vigour. By reason of the considerable magnifying powers attained, its utility for military observations, sea views, mountainous scenery, and architectural subjects (in which all defects of perspective is entirely destroyed) will be universally approved of.

This Tele-photo objective may also be used for portraiture (half life size), modelling splendidly without retouching. The Panorthoscopic Lens may be detached from its amplifier and used as an *extra rapid* rectilinear combination.

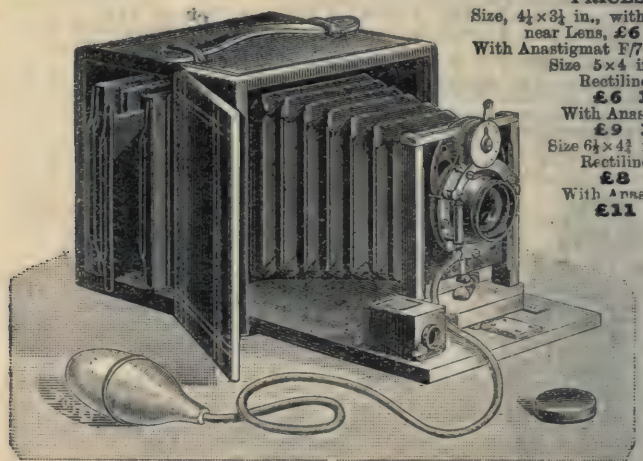
This instrument is delivered in a morocco case at following prices:—

	In Brass.	In Aluminium.
For Half-plate Cameras magnifying from 3 to 8 times.. ..	£5 4s.	.. £7 4s.
For Whole-plate Cameras magnifying from 5 to 10 times ..	£6 8s	.. £8 16s.

THE NEW TELE-PHOTO DETECTIVE LENS, magnifying from 3 to 8 times, working instantaneously with short focus, adaptable to all folding Hand Cameras, or Magazine Cameras with independent shutter. Price, in Brass, £4; in Aluminium, £5 5s.

THE ULTRA HAND CAMERA

Is set up by two movements ready for taking pictures. To those who are tired and disappointed by the uncertain results obtained by magazine hand cameras, this up-to-date folding model will give entire satisfaction. It is fitted with focussing screen, three double dark slides for plates or cut films, central swing back, our best Rapid Symmetrical Lens and new central Shutter for time or instantaneous exposures, also rising front and adaptable for roll-holder. Is made to screw on stand in either horizontal or vertical position. The fine leather covering makes it an elegant instrument for either lady or gentleman.



PRICES

Size, 4¼×3¼ in., with R. Rectilinear Lens, **£6 8 0.**
With Anastigmat F/7 **£9 4 0.**
Size 5×4 in., with R. Rectilinear Lens, **£6 16 0**
With Anastigmat F/7 **£9 12 0**
Size 6½×4¾ in., with R. Rectilinear Lens **£8 0 0**
With Anastigmat F/7 **£11 8 0**

[*See preceding and following pages.*

A PHOTOGRAPHIC MARVEL FOR CYCLISTS!





The Pocket Ultra Camera

Is the smallest of the 'Folding' type that can be realised.

The following specification will, no doubt, satisfy, if not astonish, the most ardent and critical amateur.

1. The Body is made of Mahogany, polished inside.
2. It is covered with best Morocco leather.
3. The cone-shaped Bellows is of best leather.
4. Horizontal and Vertical Movements at front.
5. Focussing Adjustment by rack and pinion motion, also engraved plate for focal distances.
6. Double-action Swing Back.
7. Ground-glass Focussing Screen in frame set on springs, permitting the insertion of dark slide behind.
8. A Roll Film-holder, or Changing-box, can be adapted when required.
9. The Finder pivots for use in both positions.
10. The Camera can be screwed to a Tripod Stand.
11. The Double Dark-slides are extra light; weight, 2 ozs.
12. The Objective is a Rapid Rectilinear, F/8, of our best quality.
13. The Shutter works between the Lenses, it gives both Time and Instantaneous Exposures, is fitted with both Finger and Pneumatic Releases, Speed Indicator, and Iris Diaphragm.
14. The Carrying Case is of best Morocco, velvet lined, is provided with sling, also short straps for attachment to cycle frame.

The Camera for Plates $4\frac{1}{4} \times 3\frac{1}{4}$ measures $6 \times 5 \times 2\frac{1}{2}$ ins., and weighs 1 lb. 14 oz.
The same, in Carrying Case with 3 Dark-slides, measures $10 \times 6\frac{1}{2} \times 3$ ins., and weighs 4lbs.

The Camera for plates $6\frac{1}{2} \times 4\frac{1}{4}$ measures $9 \times 7 \times 3$ ins. and weighs 3 lbs.
The same, in Carrying Case with 3 Dark-slides, measures $9 \times 7\frac{1}{2} \times 4\frac{1}{2}$ ins., and weighs 6lbs.

	$4\frac{1}{4} \times 3\frac{1}{4}$	$6\frac{1}{2} \times 4\frac{1}{4}$
A. With Rapid Rectilinear Lens	£7 4 0	£9 0 0
B. With Clement & Gilmer's Anastigmat, F/7	10 8 0	13 16 0
Extra Dark-slides	0 7 3	0 8 0

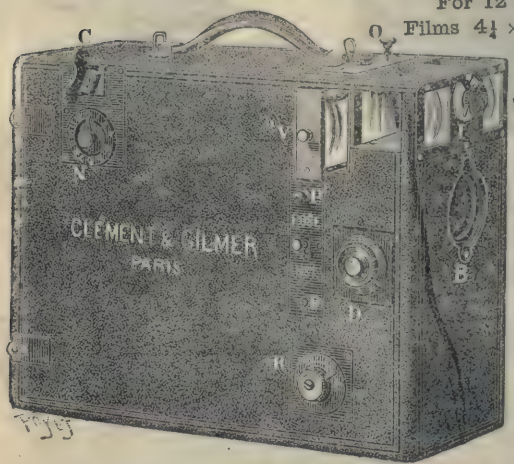
[*See preceding and following pages.*

FRANCE.

'Practice Makes Perfect.'

THIS old and true maxim is borne out in the construction of **Clement & Gilmer's** latest **'OMEGA' HAND CAMERAS.** The Drawing and Description show that every feature has been studied and worked out in a practical way.

'OMEGA' No. 2 BIS.



For 12 Plates or Cut Films 4¼ × 3¼ in., fitted with best Rapid Rectilinear Lens, and covered in Morocco Leather.

V.—View Finders Clear Vision (three), one of which is for use when Camera is mounted on a Tripod Stand, or held at eye-sight level.

D.—Rack and Pinion Movement of Lens, with engraved plate for distances.
I.—Indicator of Apertures of Iris Diaphragm.
O.—Button of Capped Setting Shutter. This operation is done by raising it.
R.—Speed Regulator, for varying the Rapidity of Shutter.
P.—Press Button to release Shutter.
P'.—Air release of Shutter, for rubber ball and tube.
C.—Key for changing Plates.
N.—Automatic Counter.
B.—Disc for protecting Lens.

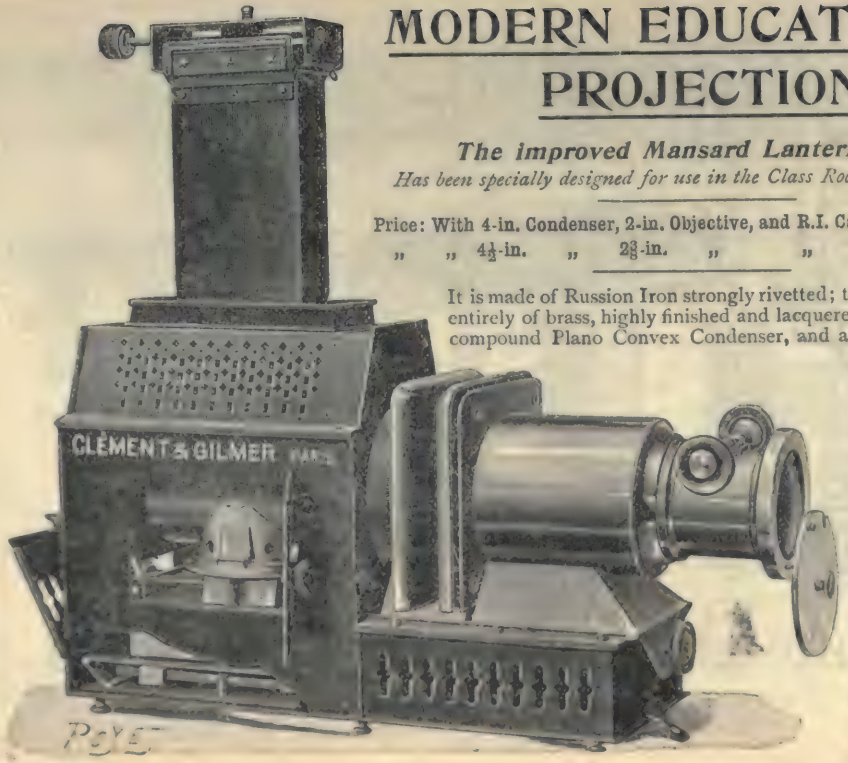
Dimensions—Length, 9¾; Width, 4¼; Height, 7¼ inches. Weight, 5½ lbs. when charged. The leather handle is fitted with two metal loops for applying Sling Strap if needed. The Shutter is on the Guillotine system, and gives an equal illumination all over the plate. The Camera is fitted with female screw plates for both positions on Stand.

PRICE ... ... £4 16 0.

With Clement & Gilmer's Anastigmat Lens, F/7 ... £8.

[*See preceding and following pages.*

MODERN EDUCATION BY PROJECTION.



The improved Mansard Lantern No. 2b,

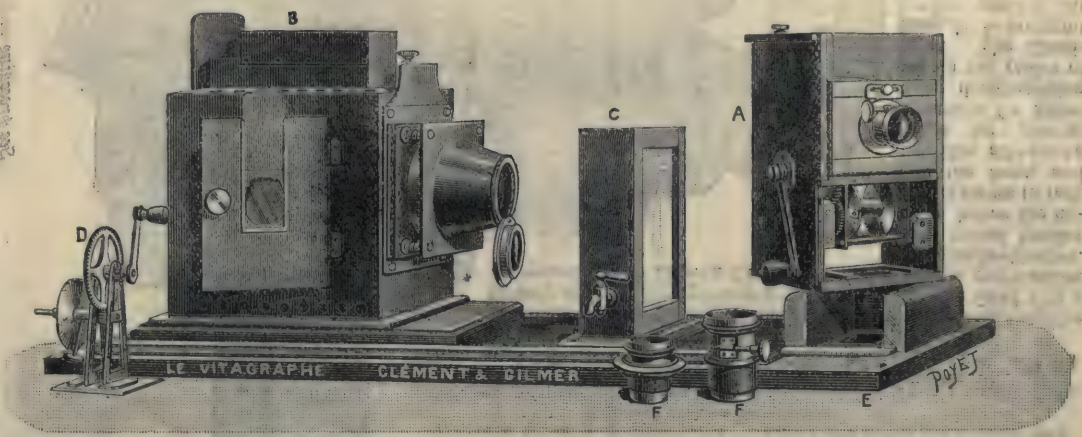
Has been specially designed for use in the Class Room (see illustration).

Price: With 4-in. Condenser, 2-in. Objective, and R.I. Carrying Case, £4 4s.
„ „ 4½-in. „ 2⅜-in. „ „ „ „ £5 5s.

It is made of Russion Iron strongly rivetted; the front and stage are entirely of brass, highly finished and lacquered. It is fitted with a compound Plano Convex Condenser, and a double combination achromatic objective. The milled headed knob below the objective serves to rack out the front, and provides adequate space for placing apparatus for scientific demonstration within the radius of light. The illuminant is a powerful 4-wick paraffin oil lamp which is placed on an adjustable platform, for the accurate centreing of this, or any other source of light that may be utilised.

See preceding and following pages.

CLEMENT & GILMER'S 'VITAGRAPH.'



THIS illustration shows the complete apparatus for projection and photography, with special large lantern and alum trough, which are only supplied at an extra charge. *Special Catalogue Post Free on Application.*

[See preceding and following pages.

ANIMATED PROJECTION AND PHOTOGRAPHY!

BY CLEMENT & GILMER'S

'VITAGRAPH.'

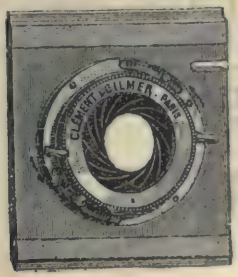
THE triumphant success obtained in all parts of the globe by this wonderful machine have gained for it an unprecedented reputation of perfection. Daily testimony confirms that as a **Projector** it is **an instrument of precision. It is not a toy nor a simple accessory** to the Lantern, but a strong and accurately constructed machine that will support the wear of daily exhibitions. Can be worked by any novice.

The 'Vitagraph' also **takes pictures**, so that purchasers can photograph scenes of interest in their own locality, which adds immensely to the attraction of this marvellous projection. **Film transparencies** ready for projection always in stock in **large variety, hundreds** of subjects can be supplied on immediate demand. Scenes of popular events are daily added to our collection. Send for Price List and full particulars. Recollect that the 'Vitagraph' competes for efficiency and price with all genuine machines on the markets of the world.

SOLE MANUFACTURERS:

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CLEMENT & GILMER'S UNIVERSAL ADAPTER.



A Mechanical Flange, receiving various sizes of Lenses, dispensing with extra Fronts to Cameras.

In five sizes.

No. 1 full aperture	...	2-in. in brass	...	16/-
,, 2 ,,	...	2½-in. ,,	...	17/6
,, 3 ,,	...	2¾-in. ,,	...	22/-
,, 4 ,,	...	3-in. ,,	...	30/-
,, 5 ,,	...	4-in. ,,	...	40/-
No. 1 full aperture	...	2-in. in aluminium	...	21/6
,, 2 ,,	...	2½-in. ,,	...	24/-
,, 3 ,,	...	2¾-in. ,,	...	28/6
,, 4 ,,	...	3-in. ,,	...	40/-
,, 5 ,,	...	4-in. ,,	...	52/-

[*See preceding pages.*

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OPTICIAN,

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125—BOULEVARD VOLTAIRE—125

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NEW ANASTIGMAT LENSES.

Planigraph with dissymmetrical combination ... ... *f*/1:9.
Planigraph with symmetrical combination ... ...*f*/1:7:5.

LENSES OF EVERY DESCRIPTION

For Portraiture or Landscapes, Wide-angle and Instantaneous.

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NEW RAPID HEMISPHERIC LENSES.

RECTILINEAR LENS,

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PORTABLE INSTANTANEOUS APPARATUS,

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SPECIAL SHORT-FOCUS OBJECTIVES FOR ANIMATED PROJECTIONS.

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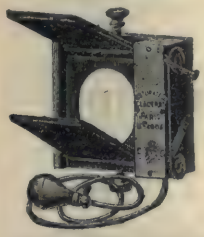
PNEUMATIC SHUTTER,

Patented s. g. d. g.

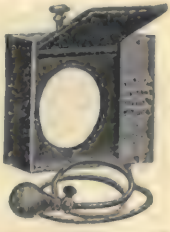
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DOUBLE-FLAP SHUTTER,

with three transformations. Placing optional, instantaneous; laid out on the first plans. Opening, 1¾ ins. to 5 ins.

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TRADE-MARK.

SINGLE-FLAP SHUTTER,

suitable for the Studio, placed before the objective, or in the Camera. Opening, 1¾ ins. to 7½ ins.

To be obtained at the principal dealers in Photographic Materials.

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OFFICES: 2 RUE DU CANAL ST. MARTIN,
FACTORIES { 169, 171, 173 QUAI VALMY,
168 QUAI JEMMAPES, } PARIS.



LENSES OF ALL KINDS. SPECIAL MATTER IS FOR ENGLAND.
Rapid Rectilinear, Wide-Angle, Periscopic, and Single Lenses. Finders and Condensers. Isochromatic Screens.



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CELEBRATED PATENT HAND CAMERAS.

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With Rapid Rectilinear or Single Achromatic Lenses.



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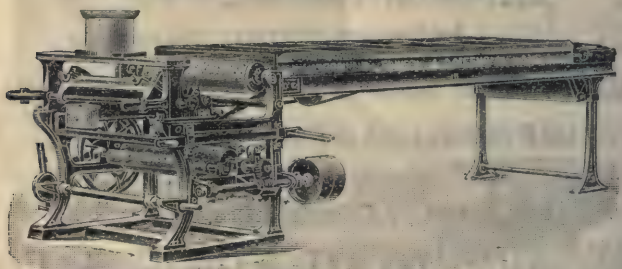
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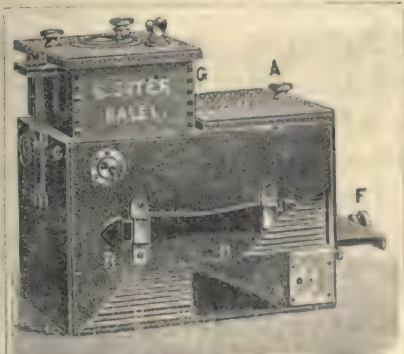
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Manufacturer of

Photographic Materials

OF EVERY DESCRIPTION FOR THE EXPORT AND HOME TRADES.

Largest Warerooms in America.

Ample Factory facilities at Jersey City.

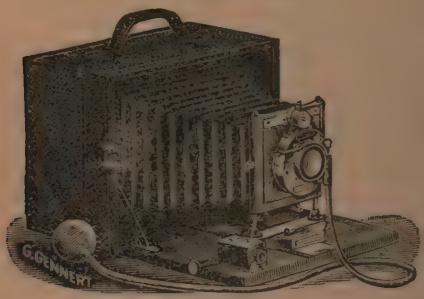
REPRESENTATIVES WANTED IN ALL COUNTRIES.

Liberal Discounts to the Trade.

THE MONTAUK.

AMERICA'S IDEAL HAND-CAMERA

— STYLE I. —



THIS Camera has all modern Improvements, such as rack and pinion focus device, rising and falling front, side shifting front, double swing back, spring-actuated ground glass frame, reversible view finder, made of polished mahogany, all brass-work draw-file finished, and externally covered with seal grained leather. Price includes Improved Rapid Symmetrical Lens *F*/8, fitted with Iris Diaphragm, and between-lens pneumatic Shutter fitted with speed indicator. Plates, cut or roll films, may be used at will, and camera will accommodate three double dark slides. Size of camera, 4 × 5, only 7 × 6½ × 5.

— PRICE LIST. —

For Plates:—	5×4			7×5			8¼×6½			10×8	
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.
Montauk I.	5	15	0	7	5	0	10	5	0	12	5
Double Dark Slides, each	0	5	0	0	6	0	0	7	0	8	0
Roll Holder	2	2	0	2	12	0	3	6	0	5	0
Film Rolls, 48 exposures	0	14	3	0	19	0	0	19	0	1	5
Black Sole Leather Cases	0	8	0	0	12	0	0	14	0	0	16

Special Sizes made to Order.

G. GENNERT Mfr., 24 & 26 East 13th St., NEW YORK, U.S.A.

THE . .

STEREO. MONTAUK.



THE construction is self-evidently superior, as the cut shows. It is extremely compact and handy. Has Rising Front, Reversible Finder, and short bed for wide-angle Lenses. The Price includes a pair of 5-in. Symmetrical Lenses, F·8, and a Bausch & Lomb Iris Diaphragm between-lens Shutter. Made in three sizes $6\frac{1}{2} \times 4\frac{3}{4}$, 7×5, 8×5, at the universal Price of—

£13 12s.

Camera without Lenses or Shutter, £7 10s.

DOUBLE DARK SLIDES, 6*s.* each.
SOLE LEATHER CASES, 12*s.* each.

PECIAL SIZES MADE TO ORDER.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

THE . . . .

MONTAUK

Junior Camera.

Our latest accommodation to the ever-changing taste of the public,

A QUARTER-PLATE SNAPSHOT BOX

of the highest efficiency. With Time and Instantaneous Shutter, Achromatic Lens and Diaphragms, Ground Glass and Tripod Socket, and two Square Finders. The exterior covered in handsome Black Grained Leather. It will accommodate three Double Dark Slides, one of which is included in the price.

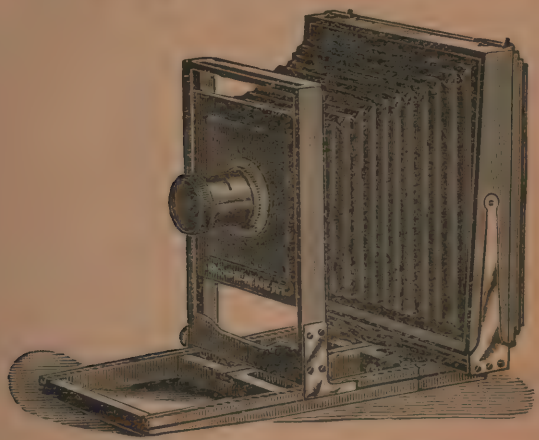
Size of box, 5 × 5 × 7, **£1** each.

Extra Double Dark Slides, with Ebonite Slides 4/- each.
Black Sole Leather Case, with Straps, ... 6/- „

LIBERAL DISCOUNTS TO THE TRADE.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

The Brighton Camera



A 20th CENTURY PRODUCT.

THIS universal Camera of the highest order was designed with special regard to the wants of the Professional. It is of true merit in most difficult situations.

THE BRIGHTON has both front and back focus, very great latitude of swings, self-centreing front with extra large flush rabbeted board, Drop front for short focus lenses, Reversible Back, spring-actuated Ground Glass Frame, and double Tripod sockets to allow of adjusting the centre of gravity. Workmanship and material the very best. Bellows of the best red leather.

— PRICE LIST. —

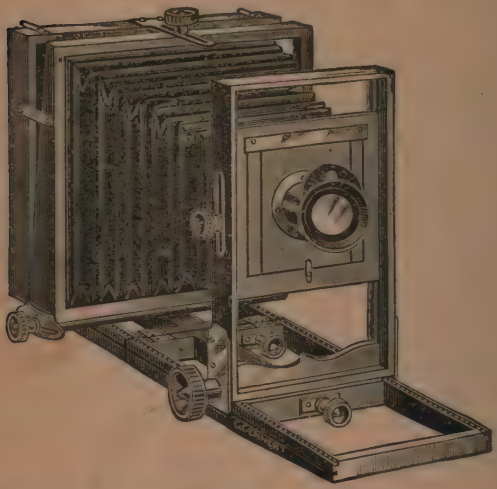
Including Case and one Double Dark Slide.

For Plates.		Extra Double Dark Slides.	For Plates.		Extra Double Dark Slides.
7 × 5	£4 18 0	£0 6 0	10 × 8	£6 2 0	£0 8 0
8 × 5	5 6 0	0 6 0	14 × 11	8 10 0	1 0 0
8½ × 6½	5 15 0	0 7 0	17 × 14	12 5 0	1 10 0

LIBERAL DISCOUNTS TO THE TRADE.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

THE OXFORD.



Materials and Workmanship Excellent.

This is our Competition Box. It has all attachments, such as Rising and Falling Front, Rack Focus, Reversible Back, spring-actuated Ground Glass Frame, &c.

Price includes Grey Duck covered Case and one Double Dark Slide.

8½ × 6½ only	£3 5s.	Extra Double Dark Slides	7s. each.
10 × 8 „	£3 19s.	„ „	8s. „

LIBERAL DISCOUNTS TO THE TRADE.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

THE SIGNAL LAMPS.



Signal Pocket.—Price 2/-

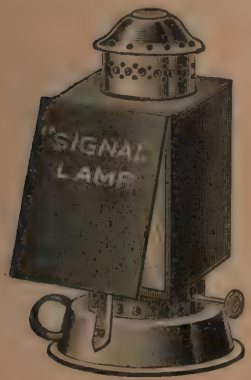
The Signal Dark-room Lamps are strictly a class by themselves, and represent the latest American ideas.

They give ample light with a minimum of smoke.

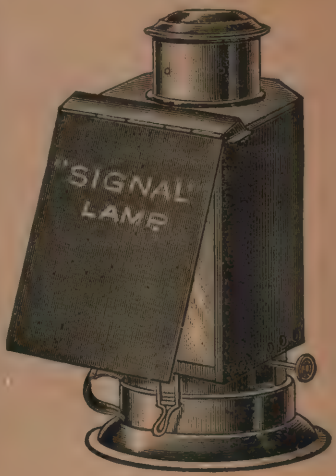
No Soot! No ill Smell!

Burn for twenty-four hours without refilling; and are sold at very reasonable prices.

Nos. 1 and 2 have both Orange and Ruby Glasses.



No. 1.—Price 4/-



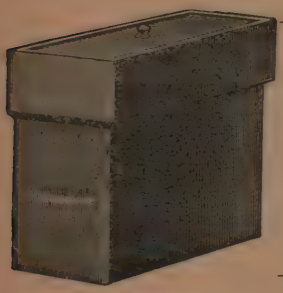
No. 2.—Price 6/-

LIBERAL DISCOUNTS TO THE TRADE.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

THE UNIVERSAL
HARD RUBBER FIXING BOX.

WITH COVER.



MADE
ENTIRELY OF
KILL'S
PATENT
INDURATED
RUBBER.



Universally recognised as the only proper method of fixing:—
Enough said.

We have tons of testimonials as to their great merit but no room to print them.

Size No. 1 accommodates twenty-two quarter, half, or twelve whole plates. Price **18s. 6d.**

Size No. 2 accommodates twenty-two 5 × 4, seven or eight Plates, or eleven 10 × 8 Plates. Price **21s.**

RUBBER FIXING BOXES

To accommodate twelve Plates, without cover.

	s.	d.		s.	d.
Quarter-Plate	6	6	..... 5×4	7	0
Half ,, ...	7	6	.. .. 7×5	8	0
Whole ,, ...	11	6	..... 8×5	8	6
$4\frac{3}{4} \times 6\frac{1}{2}$,, ...	8	0	..... 10×8	14	0

LIBERAL DISCOUNTS TO THE TRADE.

G. GENNERT, Mftr., 24 & 26 East 13th St., NEW YORK, U.S.A.

THE . .

Gennert
Hard Rubber Trays.

Practically the only Indestructible Photographic Dish.



Made of Kill's Patent Indurated Rubber.

5¼ × 4¼, deep	... 1/9 each.	12¾ × 10⅜, extra deep	8/- each.
7¼ × 5¼, ,,	... 2/3 ,,	16 × 12, ,,	10/- ,,
8½ × 5½, ,,	... 2/6 ,,	19 × 15, ,,	14/- ,,
9 × 7, ,,	... 3/4 ,,	22 × 18, ,,	19/- ,,
10½ × 8½, ,,	... 4/4 ,,	26 × 21, ,,	33/- ,,

23 × 19, for silvering, extra deep, 22/6.

LIBERAL DISCOUNTS TO THE TRADE.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

DURANOID.

A composite material closely resembling rubber. Jet black finish, highly polished, and repelling acids and alkalies.

• • •

PRICE LIST.

Quarter-plate	6d.
5×4	9d.
Half-plate and 7×5	1/-
8×5	1/3
Whole-plate	1/6
10×8	2/-

The shape and appearance resemble closely a polished rubber disc, and fine raised points adorn the inside bottom to prevent adhesion between the plate and tray.

LIBERAL DISCOUNTS TO THE TRADE.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

THE EDDOWES
CAMERA NEGATIVE VIGNETTER.

Price Complete, Boxed, 32s.



A good Vignetter is, next to the Lens, the most necessary adjunct of every Studio Outfit. It is a necessity for the proper blending off of the portrait at the lower edge when not used as a Vignetter.

Vignettes are made better and with greater facility in the camera than in the printing frame.

THE EDDOWES VIGNETTER fits all Cameras.

Can be brought nearer to the lens, or removed from it.

Will yield all shades of Vignettes from white to black.

Can be raised or lowered.

Is attached entirely to the Camera, and leaves it free to move on the stand.

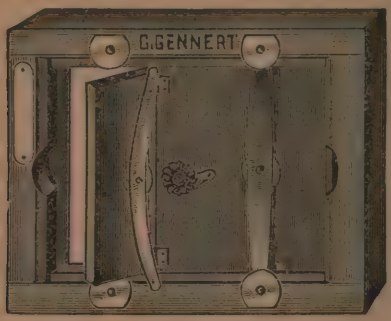
Is manipulated from the rear of the Camera while its operator observes the effect on the ground glass.

Only 32s. Complete, Boxed.

Liberal Discounts to the Trade.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

. . The Gennert . .
PRINTING FRAMES.



THE advantages of this American style of press over the cheaper foreign makes is at once evident, and must be appreciated. They are strong, handsome, durable, and the flange at the break of the back effectually excludes light from the joint. They have also an improved ratchet Talley. They admit of examining two-thirds of the entire print.

½-plate	...	1/6	each	...	14/-	dozen	.....	12×10	...	4/-
5×4	...	1/7	,,	...	14/10	,,	.....	14×11	...	7/-
½-plate	...	1/9	,,	...	16/6	,,	.....	17×14	...	10/-
7×5	...	2/2	,,	...	20/-	,,	.....	20×16	...	12/-
8×5	...	2/3	,,	...	21/-	,,	.....	20×17	...	12/-
¼-plate	...	2/7	,,	...	24/6	,,	.....	22×18	...	16/-
10×8	...	3/2	,,	...	30/-	,,	.....	24×20	...	20/-

LARGER SIZES MADE TO ORDER.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

AMERICAN BACKGROUNDS.

The well-known superiority of American Backgrounds leads us to offer here a line that is certainly beyond reach of competition.

15 × 8 ft. only 42/= (boxed.)

The sizes given include the 7 feet. continuous Floorcloth.

A SELECTION OF PHOTOS (Interiors, Exteriors, &c.) will be sent on receipt of Sixpence for postage.

We guarantee the execution of these Backgrounds to be of the best American style and workmanship, They will be found extremely reasonable in price.

G. GENNERT, 24 & 26 East 13th Street, NEW YORK, U.S.A.

G. GENNERT,

24 and 26 EAST 13th STREET,

NEW YORK, U.S.A.

American Repository.

ROSS' LENSES,

ROSS-ZEISS',

ROSS-GOERZ'.

We aim to keep at all times a full complement of the Lenses manufactured by Messrs. ROSS, Ltd., and sell the same at English List Prices, plus Customs Duty only.

G. GENNERT,

24 & 26 EAST 13th STREET, NEW YORK, U.S.A.

GERMANY.

CARL ZEISS,

Optische Werkstaette,

JENA.

London Branch Office: 29 Margaret St., Cavendish Sq., W.

ANASTIGMATIC LENSES

In Five different Series for all Purposes.

SERIES VII.—ANASTIGMATLINSE 1 : 12.5.

SERIES VIIa.—SATZ-ANASTIGMAT 1 : 6.3.

New:—'The Planar' Extremely Rapid Objective,

1 : 3.6 to 1 : 6, specially constructed for Instantaneous Views, Portraits, Enlargements, and Reproductions.

Patented in Germany, Great Britain, France, Austria-Hungary, Italy, Switzerland, and the United States.

The ANASTIGMATIC LENSES are, beside by ourselves, made and supplied by the following Firms, who have obtained the Right of Manufacture:

ROSS LIMITED, London.
MR. CARL FRITSCH, vorm. Prokesch, Vienna.
MR. F. KORISTKA, Milan.
MESSRS. BAUSCH & LOMB OPT. CO., Rochester and New York City.
MESSRS. E. KRAUSS & CO., Paris.

PRISMS for Photo-Mechanical Printing Processes.
TELE-PHOTOGRAPHIC OBJECTIVES (New Construction).
IRIS SHUTTERS (for Time and Instantaneous Exposures).

CATALOGUES POST FREE ON APPLICATION.

NNN

AUSTRIA.

IMPORTANT NOTICE

For Dealers and Photographers.

THE BEST AND CHEAPEST PHOTOGRAPHIC CARDS

(PRINTED AND WITHOUT PRINTING)

To be obtained in the first Austrian Photographic Mounts Steam Manufactory of

BERNHARD WACHTL, Vienna vii. Kirchberggasse, 37.

Also the following Specialities:—

Dry Plates, Albumenized Paper, Painted Backgrounds, Accessories in Wood and Papier Mâché, Cameras, Burnishers, Trays in Porcelain and Papier Mâché, Cut-out Mounts, Stephanie Vignettes, Detective and Hand Cameras, Glasses, Aristo Paper, Celloidin Paper, Bromide and Platinotype Papers, Lenses, Chemicals, Orthochromatic Plates, &c.

GERMANY.

Photographic Apparatus Manufacturing Co.,

Late R. HÜTTIG & SON,

CAMERAS AND APPARATUS, LENSES, PHOTOGRAPHIC BRASSWORK, &c.	DRESDEN, SAXONY. Apply for Catalogue.	DEALERS IN ALL PHOTOGRAPHIC MATERIALS AND SUNDRIES.

NEW ZEALAND.

WILLIAM PARK,

IMPORTER AND DEALER IN PHOTOGRAPHIC GOODS, MAGIC LANTERNS, AND SLIDES.

Cameras and Lenses by best English and Foreign Makers.

Goods sent to all parts of New Zealand and South Sea Islands.

WELLESLEY ST. EAST, AUCKLAND, NEW ZEALAND.

AMERICA.

THE AMERICAN ICONOSCOPE

(PATENTED)

CAN BE QUICKLY ATTACHED TO ANY CAMERA.

Its definition is exquisite. Its brilliancy is unsurpassed. Its image is not inverted, *and not reversed from left to right.* Optically it is novel—entirely different from, and much superior to, any other Finder of the brilliant type.

See Dr. Mercer's Article at page 813 of this Almanac.

Address: "ICONOSCOPE," 324 Montgomery Street, Syracuse, New York, U.S.A.

AMERICA.

GEORGE MURPHY.

(1878–1897).

Manufacturer, Importer and Dealer.

NEW YORK HEADQUARTERS

— FOR —

Seed Dry Plates, Films & Developers.

'GREATER NEW YORK.'

Apparatus; Eastman's Photographic Papers.

PHOTO-CHEMICALS OF ANILIN CO.

FOREIGN & DOMESTIC TRADE SUPPLIED.

57 EAST 9th STREET, NEW YORK.

Photographic Patents secured in the United States.

CORRESPONDENCE INVITED.

MURRAY & McLAUGHLIN,

Attorneys and Counsellors at Law,

55 LIBERTY STREET,

TIMOTHY J. M. MURRAY.
J. FAIRFAX McLAUGHLIN, Jr.

NEW YORK, U.S.A.

THE TECHNICAL COMPANY,

22 Congress Street, Boston, U.S.A.

SPECIAL HAND CAMERAS.

Cable Address:—"PAPILIO, BOSTON."

CANADA.

DAVID H. HOGG,

Manufacturer and Importer

OF

PHOTOGRAPHIC GOODS,

662 CRAIG STREET,
MONTREAL, CANADA.

Branch Warehouse—
159 BAY STREET, TORONTO, CANADA.



FRANCE.

THE SYNOSCOPE.

NEW SHORT-FOCUS
WIDE-ANGLE RECTILINEAR LENS.

2½ inches focus covers 7×5 plate; 3 inches focus covers 9×7.
Catalogues Free.

A. GORDE, Manufacturing Optician,
15 RUE D'ARMAILLE, PARIS.

SOUTH AUSTRALIA.

S. P. BOND, Lmtd.,

IMPORTERS of PHOTO MATERIALS & OPTICAL LANTERNS
GOVERNMENT CONTRACTORS,
11 ALMA CHAMBERS, GRENFELL STREET,
Showrooms: 48 PIRIE STREET,
ADELAIDE SOUTH AUSTRALIA.
Correspondence and Catalogues Invited.

NOTICE OF REMOVAL

On JANUARY 1st, 1893, the Offices of the 'British Journal of Photography,' and the 'British Journal Photographic Almanac' will be REMOVED to

24 Wellington Street, Strand,

LONDON.

THIS STEP, WHICH HAS BEEN IN CONTEMPLATION FOR A CONSIDERABLE TIME, IS RENDERED NECESSARY BY THE REQUIREMENT OF GREATER ACCOMMODATION FOR THE VARIOUS DEPARTMENTS THAN WAS OBTAINABLE AT 2 YORK STREET, COVENT GARDEN, AT WHICH ADDRESS THE 'JOURNAL' AND 'ALMANAC' HAVE BEEN CONTINUOUSLY PUBLISHED ALMOST SINCE THEIR ESTABLISHMENT.

THE NEW PREMISES ARE LARGER AND MORE CONVENIENT THAN THE OLD, AND WILL ENABLE THE PUBLISHERS TO COPE WITH THE GROWTH OF BUSINESS FOR WHICH THE INCREASING CIRCULATION OF THE 'JOURNAL' AND 'ALMANAC' IS RESPONSIBLE, WHILE THE GREATER FACILITIES OBTAINED WILL ADD TO THE CONVENIENCE OF THE PUBLISHING, EDITORIAL, AND OTHER DEPARTMENTS.

FROM THE DATE ABOVE NAMED, ALL COMMUNICATIONS SHOULD BE MADE TO THE NEW ADDRESS—

24 WELLINGTON STREET, STRAND.

LETTERS ON BUSINESS MATTERS SHOULD BE ADDRESSED TO THE PUBLISHERS, HENRY GREENWOOD & CO., AND EDITORIAL LETTERS TO THE EDITORS.

HENRY GREENWOOD & CO.,
24 WELLINGTON ST., STRAND, LONDON.

Advertisement Scale, see page 1396.
Subscription Scale, see page 1221.

ROSS, LIMITED, 8 pp. Extra received late,
ELLIOTT & SON, 2 pp. Extra received late,
Accounts for 10 pp. Extra as above folio.

THE OLDEST PHOTOGRAPHIC JOURNAL.

Estab. 1854. PUBLISHED EVERY FRIDAY. Price Twopence.

— THE —

British Journal of Photography

THE BRITISH JOURNAL OF PHOTOGRAPHY is recognised as the Principal Photographic Journal in the world, and circulates among all leading Professional and Amateur Photographers. The earliest and most reliable news of Photographic Practice and Progress appears in its pages.

THE BRITISH JOURNAL OF PHOTOGRAPHY, as a Medium of direct and certain communication with all classes of Amateur and Professional Photographers throughout the world, strongly commends itself to Photographic Advertisers.

SCALE OF CHARGES FOR ADVERTISEMENTS.

WHOLE PAGE, 1 Insertion	£4 10 0		QUARTER PAGE, 1 Insertion	£1 7 6	
HALF PAGE	„	2 10 0	FIFTH PAGE	„	1 2 6
THIRD PAGE	„	1 15 0	SIXTH PAGE	„	0 19 0

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CHARGE FOR SPECIAL INSET CIRCULAR, ON ANY COLOUR PAPER: One page, £5 5s.; Two pages, £8 10s.; Four pages, £12 12s. Advertisements on the Cover, and a few others of great prominence, are charged by Special Agreement.

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One Inch	0 4 0	0 3 6 „	0 3 0 „

Charge for small Prepaid Advertisements of Four Lines (each Line containing Seven Words), of the following Classes ONLY:

Professional Photographers Requiring Assistants ... ... } 1/- Prepaid Rate
Operators, &c., Wanting Situations ... ... }
Photographic Premises to be Let or Sold ... ... }
Second-hand Photographic Apparatus for Sale ... ... }

Each Additional Line (Seven Words), Sixpence.

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LARGE ADVERTISEMENTS should reach the Publishing Offices not later than TUESDAYS, but

SMALL ADVERTISEMENTS can be received up to 2 p.m. on Wednesdays.

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HENRY GREENWOOD & CO., PUBLISHERS,
24 WELLINGTON STREET, STRAND, LONDON.

Subscription Scale, see page 1221.
Removal Notice, see pages 558 and 1395.

Telegrams:
'ACETYLENE, MANCHESTER.'

THE MANCHESTER
ACETYLENE GAS & CARBIDE CO.
ACETYLENE GAS AND LIGHTING ENGINEERS.

Head Offices and Works—
ST. SIMON STREET, SALFORD, MANCHESTER, England.

Manufacturers of Kay's Patent Acetylene Gas Generators
(By Royal Letters Patent). The only thoroughly safe and reliable practical Generators for the Manufacture of pure Acetylene Gas on a commercial scale.

Patent ACETYLENE PHOTOGRAPHIC OUTFITS
SPECIALLY DESIGNED FOR HIGH-CLASS PORTRAITURE.

COMPLETE OUTFIT, consisting of heavy, Artistic, Wrought-iron, Telescopic Stand, of high-class workmanship and finish throughout, Enamelled in Dead Black, extending to 7 ft. high. Fitted with 4 ft. diameter Special Reflector and Diffuser, adjustable to any angle or position, moving on ball swivel joints, instantly secured by tightening wing nut. Fitted with 20 burners of 50 actual candle power. Total Illumination, 1000 candle power.

PRICE COMPLETE (with ordinary Burners) ... **£5 5s.**

Prices of Generators to suit above:—

No. 1a.—20 Lights, for about	½	hour of each charge	...	£3	10s.
2a.—20 ,, ,,	1	,, ,,	...	5	0
3a.—20 ,, ,,	1½	,, ,,	...	7	10
4a.—20 ,, ,,	2	,, ,,	...	10	10
5a.—20 ,, ,,	3	,, ,,	...	12	10

We specially recommend our No. 4a Generator for those requiring a large and constant supply of light. Fitted with two Generators. All our machines can be recharged while lights are burning. The generation of gas is automatically controlled, and can also be regulated by hand. The Generators are of Cast Iron, and the whole Apparatus will last, with ordinary usage, a lifetime. The pressure in our Generators does not exceed 1½ in. water column.

THE ACETYLENE LIGHT is a strongly Actinic Light, and with our New Reflector is diffused to the best advantage, free from smell or smoke. The light being absolutely permanent, the Time of Exposure always remains the same. By the use of Rapid Plates and quick-working Lenses, Portraits can be taken in Two Seconds. Specimens of Photographs taken with our Outfit to be had on application, or to be seen at our Offices and Works.

EFFICIENCY OF BURNERS.—Each 1 cubic foot of Acetylene consumed in a proper burner gives 50 candle power. We have not assumed fictitious values for our burners, and our clients may rely on our calculations being absolutely correct.

COMPLETE CATALOGUES ON APPLICATION.

Best quality **CALCIUM CARBIDE**, guaranteed pure, in **7lb., 14lb.**, or **28lb.** tins, sealed, **4d. per lb.**, tins free. Special quotations for Carbide packed in ½ cwt. and 1 cwt. iron drums (drums returnable).

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Estab. 1854. PUBLISHED EVERY FRIDAY. Price Twopence.

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British Journal of Photography

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HALF PAGE	,,	2 10 0	FIFTH PAGE	,,	1 2 6
THIRD PAGE	,,	1 15 0	SIXTH PAGE	,,	0 19 0

EIGHTH PAGE, 1 Insertion, £0 15 0

REDUCTION FOR A SERIES OF INSERTIONS.

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	Once.	6 Inserts. each	13 Inserts. each	26 Inserts. each	52 Inserts. each
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Three-quarter Inch	0 4 6	0 4 0	0 4 0	0 4 0	0 3 6
One Inch	0 6 0	0 5 6	0 4 6	0 4 0	0 4 0

SINGLE COLUMN TRADE ADVERTISEMENTS (Prepaid Rate).

	Once.	26 Inserts.	52 Inserts.
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Three-quarter Inch	0 3 0	0 3 6 ,,	0 2 6 ,,
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Professional Photographers Requiring Assistants ... ...
Operators, &c., Wanting Situations ... ...
Photographic Premises to be Let or Sold ... ...
Second-hand Photographic Apparatus for Sale ... ...
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HENRY GREENWOOD & CO., PUBLISHERS,

24 WELLINGTON STREET, STRAND, LONDON.

Subscription Scale, see page 1221.
Removal Notice, see pages 558 and 1395.

Telegrams:
'ACETYLENE, MANCHESTER.'

THE MANCHESTER
ACETYLENE GAS & CARBIDE CO.
ACETYLENE GAS AND LIGHTING ENGINEERS.

Head Offices and Works—
ST. SIMON STREET, SALFORD, MANCHESTER, England.

Manufacturers of Kay's Patent Acetylene Gas Generators
(By Royal Letters Patent). The only thoroughly safe and reliable practical Generators for the Manufacture of pure Acetylene Gas on a commercial scale.

Patent ACETYLENE PHOTOGRAPHIC OUTFITS
SPECIALLY DESIGNED FOR HIGH-CLASS PORTRAITURE.

COMPLETE OUTFIT, consisting of heavy, Artistic, Wrought-iron, Telescopic Stand, of high-class workmanship and finish throughout, Enamelled in Dead Black, extending to 7 ft. high. Fitted with 4 ft. diameter Special Reflector and Diffuser, adjustable to any angle or position, moving on ball swivel joints, instantly secured by tightening wing nut. Fitted with 20 burners of 50 actual candle power. Total Illumination, 1000 candle power.

PRICE COMPLETE (with ordinary Burners) ... **£5 5s.**

Prices of Generators to suit above:—

No. 1a.—20 Lights, for about	½	hour of each charge	...	£3	10s.
2a.—20	,,	,,	...	5	0
3a.—20	,,	1½	...	7	10
4a.—20	,,	2	...	10	10
5a.—20	,,	3	...	12	10

We specially recommend our No. 4a Generator for those requiring a large and constant supply of light. Fitted with two Generators. All our machines can be recharged while lights are burning. The generation of gas is automatically controlled, and can also be regulated by hand. The Generators are of Cast Iron, and the whole Apparatus will last, with ordinary usage, a lifetime. The pressure in our Generators does not exceed 1½ in. water column.

THE ACETYLENE LIGHT is a strongly Actinic Light, and with our New Reflector is diffused to the best advantage, free from smell or smoke. The light being absolutely permanent, the Time of Exposure always remains the same. By the use of Rapid Plates and quick-working Lenses, Portraits can be taken in Two Seconds. Specimens of Photographs taken with our Outfit to be had on application, or to be seen at our Offices and Works.

EFFICIENCY OF BURNERS.—Each 1 cubic foot of Acetylene consumed in a proper burner gives 50 candle power. We have not assumed fictitious values for our burners, and our clients may rely on our calculations being absolutely correct.

COMPLETE CATALOGUES ON APPLICATION.

Best quality **CALCIUM CARBIDE**, guaranteed pure, in **7lb., 14lb.**, or **28lb.** tins, sealed, **4d. per lb.**, tins free. Special quotations for Carbide packed in ½ cwt. and 1 cwt. iron drums (drums returnable).

ESTABLISHED 1854.

W. W. ROUCH & CO.'S
High-class Photographic Apparatus.



ROUCH'S
'EUREKA' CHANGING BACK
(PATENT).

THESE CHANGING BACKS carry 12 Plates or 24 Cut Films, and are highly appreciated by Tourists, Amateurs, and Photographers generally, as they save the bulk and expense of double backs, and avoid the necessity of changing plates when on tour, They are fitted *to any camera*. PRICE:—½-plate, £2 10s.; 5×4, £2 15s.; 6½×4¼, £3; 7½×5, £3 10s.

The diagram shows ROUCH'S PATENT PORTABLE CAMERA, fitted with 'EUREKA' CHANGING BACK to hold 12 Plates. PRICES (with Reversing Frame and 'Eureka' Back):—6½×4¼, £7 5s.; 7½×5, £7 17s. 6d.

ROUCH'S
QUICK-ACTING LANDSCAPE LENSES.

ROUCH'S
INSTANTANEOUS DOUBLET.

For Landscapes, Groups, and Instantaneous Work.

THIS is an Aplanatic Lens, working at *f*/8, which gives a perfectly flat field and great depth of focus, and is entirely free from distortion.



PRICES.						PRICES.					
5 ×4*	.....	5 in. foc.	.....	£2	0 0	8½×6½	.....	10½ in. foc.	.....	£4	5 0
6 ×5	.....	7½ ,, ,,	.....	2	15 0	10 × 8	.....	13½ ,, ,,	.....	5	5 0
8 ×5	.....	8½ ,, ,,	.....	3	15 0	12 ×10	.....	15½ ,, ,,	.....	7	15 0
						15 ×12	.....	19 ,, ,,	.....	9	15 0

* N.B.—This is the Lens that has given such universal satisfaction when used in conjunction with the 'EUREKA' Camera.

These Lenses can be fitted with Iris diaphragms if required.

ROUCH'S WIDE-ANGLE DOUBLET.

For Landscape, Interiors, Architecture, and Copying.

Size of Plate Covered.			Focus.		Price.		Size of Plate Covered.			Focus.		Price.	
254.	4½×3¼	...	2⅝ in.	...	£2 0 0	257.	10× 8	...	8 in.	...	£4 10 0
255.	6½×4¼	...	4⅛ ,,	...	2 10 0	258.	12×10	...	12 ,,	...	5 10 0
256.	8½×6½	...	6½ ,,	...	3 10 0	259.	15×12	...	15 ,,	...	6 10 0

W. W. ROUCH & CO.,
Manufacturers of High-Class Photographic Apparatus,
161 STRAND, LONDON, W.C., *Next door to King's College.*

[*See following page and pages* 2 *and* 3.

ROUCH'S 'MODEL' DARK TENT.



THIS CELEBRATED DARK TENT is invaluable to the Amateur, both as a Travelling Dark-room for Developing or Changing Plates, and as a Permanent Laboratory at home when space is not otherwise available. It will be found replete with every convenience for working the different negative processes.

PRICES COMPLETE:

For Plates $8\frac{1}{4} \times 6\frac{1}{2}$	£6	10 0
Do. 10×8	7	0 0
Do. 12×10	7	10 0
Do. 15×12	8	10 0

Waterproof Travelling Cases, small size, 18s.; larger sizes, 25s.
All genuine Tents are stamped with our Name and Address on Ivory Plate.

COMPLETE SETS OF PHOTOGRAPHIC APPARATUS.

THE following Sets comprise the most popular of W. W. Rouch & Co.'s standard collections, and include Patent Portable Camera (see page 2), with three double dark slides, in sling case, fitted with Rouch's Instantaneous Doublet for Landscapes, Architecture, or Groups. The lens is provided with a specially adapted Instantaneous Shutter. The remaining items comprise new Adjusting Folding Tripod, Focussing Eyepiece, Argus View Finder, Focussing Cloth, Portable Chemical Laboratory, Printing Frames, Porcelain Dishes, Scales and Weights, Lantern for travelling or home use, with three dozen Rouch's Rapid Dry Plates, and all necessary chemicals and appliances for developing and storing the negatives, and printing and mounting the proofs.



Showing Camera Case packed for the Field.

Sizes for Pictures:			
$4\frac{1}{4} \times 3\frac{1}{4}$	Price, complete	£11	5 0
5×4	,, ,,	13	5 0
$6\frac{1}{2} \times 4\frac{3}{4}$	,, ,,	16	10 0
$7\frac{1}{2} \times 5$	,, ,,	17	10 0
$8\frac{1}{2} \times 6\frac{1}{2}$	,, ,,	21	10 0
10×8	,, ,,	28	0 0
12×10	,, ,,	34	0 0

ROUCH'S GELATINE PLATES (Hand Coated) give brilliant and sparkling Negatives, are as rapid as any in the market, do not give halation, and possess unequalled keeping qualities.

ROUCH'S CELEBRATED A. B. C. PYRO DEVELOPERS, in Sets, 1s. 6d., 2s. 6d., and 4s. 6d.

ROUCH'S METOQUINONE (Concentrated), Bots., 1s., 2s., and 4s.

ROUCH'S BEECHEY COLLODION LANTERN PLATES, unrivalled for brilliancy and vigour. 1s 6d. per dozen.

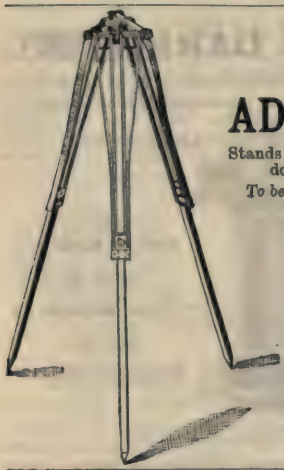
ROUCH'S COLLODIONS, for all kinds of Process work.
Largely used by the most successful workers.

W. W. ROUCH & CO.,

Manufacturers of High-Class Photographic Apparatus.

161 STRAND, LONDON, W.C. Next Door to King's College.

[*See preceding page, and pages 2 and 3.*



ASHFORD'S

IMPROVED PATENT

ADJUSTABLE TRIPOD

Stands firm, and defies all competition. Be advised and don't buy a Stand until you have seen this one.

To be obtained of all first-class Photographic Dealers.

PRICES.

TWO-FOLD.

5 ft. with 4 in. top...	18/6 each.
5 ft. with 6 in. top...	21/- ,,
5 ft. with 8 in. top	25/- ,,

THREE-FOLD.

5 ft. with 6 in. top	25/- each.
5 ft. with 8 in. top	30/- ,,

Waterproof Cases, Leather Bound, with Straps, complete :

For Two-fold Stand	5/- each.
For Three-fold Stand	4/6 ,,



ASHFORD'S

Patent Camera

Is the most rigid and useful all-round high-class Camera in the market.

The front of the half-plate is large enough to take a pair of stereo lenses. In point of accuracy and finish it is equal to anything in the market. It has double Swing Back, and the half-plate extends from 3½ to 16½ inches. Other sizes in proportion. The Slides which are a special feature are of Spanish mahogany, and are fitted with automatic catches.



PRICES, with 3 DOUBLE SLIDES :—

Quarter-plate...	£4 16 0
5×4	5 11 0
Half-plate	6 16 0

ASHFORD'S DOUBLE FILM SLIDES

Are the neatest, thinnest, and lightest made.

Send for Illustrated Catalogue POST FREE, to

Sole Patentee & Manufacturer,

J. ASHFORD,

179 ASTON ROAD,

BIRMINGHAM.

THE DALLMEYER STIGMATIC LENSES (Patent).

SERIES I., PORTRAIT LENS, F/4.

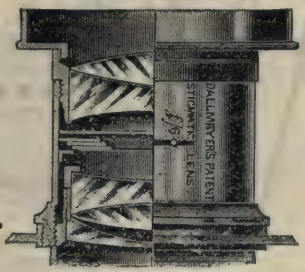
FULL PARTICULARS ON APPLICATION. FOR PRICES SEE PAGE 1406.

SERIES II., A NEW UNIVERSAL LENS, F/6.

Extreme Speed.

Great Covering Power.

Absolute Freedom from Astigmatism, and a Perfectly Flat Field.



Can be made to serve as Four Different Lenses.

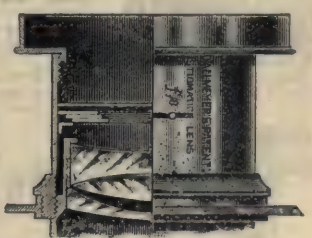
Complete Lens, as used for Rapid and Wide-angle Work.

THIS LENS is suitable for every class of Photography from Portraiture to Wide-angle Work.

The smaller sizes are particularly suited for Hand-camera Work, covering the plate *to the edges at full aperture* (F/6). At a smaller aperture (F/16) they will cover a plate at least 2 sizes larger, thus embracing a very *Wide Angle*. Besides this, each combination may be used separately, the front combination having a focus of about 1½ times, and the back twice that of the entire lens. Thus, a '*Stigmatic*' *does the work of four ordinary lenses.*



Front Combination used as Single Lens.



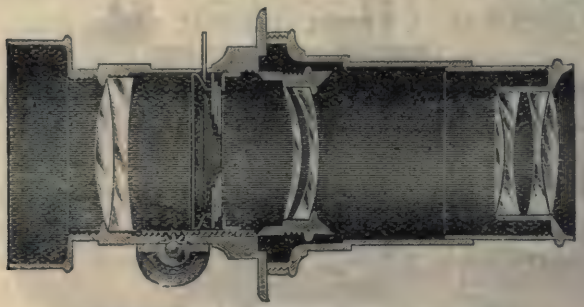
Back Combination used as Single Lens.

No.	Plate covered at full aperture, *f*/6.	Largest Plate covered at *f*/16.	Diameter of Lens.	Eq. Focus.	PRICE, with Iris Diaphragms.
1AA	2½ × 2	4½ × 3½	·55 In.	3·25 In.	£4 0 0
1A	3½ × 2½	5 × 4	·65	4·0	4 5 0
1	3½ × 3½	6½ × 4½	·8	4·5	4 15 0
2	4½ × 3½	8 × 5	·9	5·3	5 15 0
3	5 × 4	8½ × 6½	1 1	6·¼	6 15 0
4	6½ × 4½	10 × 8	1·3	7·6	8 2 6
5	8 × 5	12 × 10	1·6	9	10 10 0
6	8½ × 6½	15 × 12	1·9	10·7	13 10 0
7	10 × 8	15 × 15	2·2	12·7	18 10 0
8	12 × 10	18 × 16	2·6	15 1	24 10 0
9	15 × 12	22 × 20	3 1	18	31 10 0

J. H. DALLMEYER, Ltd. 25 NEWMAN STREET, Oxford Street, LONDON, W.

[*See following pages.*

DALLMEYER'S
TELEPHOTOGRAPHIC LENSES & ATTACHMENTS.



MODERATE POWER TELEPHOTO LENS. SYSTEM II.

No. I.—High power. Consisting of a Portrait Lens and a high-power Negative about one-fourth the focus of Portrait Lens. For mountain views and all cases whe extreme magnification is required.

No. II.—Moderate power. Consisting of a Portrait Lens and a moderate-power Negative of about half the focus of Portrait Lens. This works with sufficient rapidity to be capable of use for instantaneous exposures. Invaluable to naturalists and for marine photography.

No. III.—Consisting of a Rapid Rectilinear Lens and a moderate power Negative of about half its focus. The applications of this system are similar to those of No. 2, but the lens is not quite so rapid.

NEGATIVE ELEMENTS CAN BE FITTED to any existing Lenses by first-class Makers (Rapid and Universal Symmetricals, Double Anastigmats, &c.) providing the rapidity of the Positive Lens be not slower than *f*/8. The original Lens is in no way altered, and can be used alone as before.

Prices and Full Particulars on Application.



— HIGH-CLASS —

HAND AND STAND CAMERAS

AND OTHER APPARATUS.

Cameras Manufactured under Sanderson's Patent.

SKILLED ADVICE TO BEGINNERS.

Photographic Materials selected from the Best Markets, and

THE SPECIALTIES

Of all Well-known Makers supplied.

FIELD AND OPERA GLASSES.
TELESCOPES AND MICROSCOPES.

CATALOGUES GRATIS.

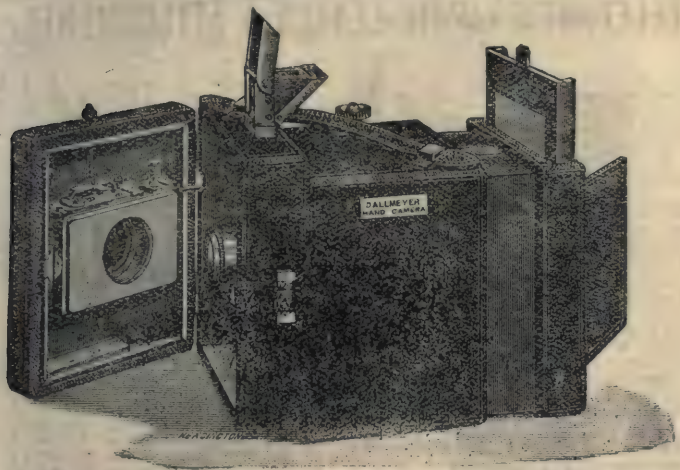
Premo Cameras of Special Manufacture and fitted with Dallmeyer Lenses.

J. H. DALLMEYER, Ltd., 25 Newman St., Oxford St., London, W.

[*See following and preceding pages.*

THE DALLMEYER HAND CAMERA.

QUARTER-PLATE SIZE.



THIS is the most simple and practical instrument which can possibly be designed. There is no complicated or delicate mechanism to get out of order, and the workmanship and materials are of the highest class. It is particularly suited for **All-round Use,** as its varied adjustments enable every description of photographic work to be undertaken with success. **DARK SLIDES** of an entirely novel form are supplied, and are a special feature of the camera. They are perfectly light-tight, and open book-form by means of a small lever, the shutters being made of thin corrugated sheet steel to ensure rigidity with compactness, and at the same time to avoid the possibility of reflection when the slide is open inside the Camera. The slides are very light and thin, 6 double slides occupying a space of 2⅝ in. only.

Artists use it because, besides **Snap-shots, carefully focussed Studies** can be obtained with it; and within certain limits, Paintings, Engravings, &c., can be photographed, **Architects and Engineers use it,** because it has a first-class rectilinear lens, and a great range of adjustment by means of the sliding front, thus enabling truly straight and vertical lines to be reproduced. **Travellers use it,** because it will stand the roughest usage without risk of a breakdown. The dark slides cannot stick or jam. **Scientists use it** because it can be kept ready for instantaneously recording any important phenomenon. The Dark Slides having metal shutters are practically proof against X Rays.

PRICE.

Camera, as above, with 6 double Dark Slides, 'Snap-Shot' Shutter, and View Finder complete, packed in Solid Leather Sling Carrying Case	£7 2 6
May be fitted with either of the following Lenses:—	
Special Hand Camera, R.R. Lens, 5½ in. focus, Iris Diaphragm	4 2 6
Patent R.R. Lens, 5×4, 6 in. focus, Iris Diaphragm	4 12 6
Patent Extra R.R. Lens, 5×4, 4·9 in. focus, Iris Diaphragm	6 2 6
No. 2 Stigmatic. Highly recommended	5 15 0

Time and Instantaneous Shutter in place of 'Snap-Shot' pattern, **7s. 6d.** *extra.*
Dark Slides supplied separately, **7s.** *each.*

An Automatic Changing Box can be supplied instead of the Dark Slides, if desired.

Customers' Own Lenses can be fitted to this Camera. J. H. DALLMEYER, Ltd., also undertake the fitting of their Lenses to any make of Hand Camera. Free Lessons in Photography to Purchasers. 5 per Cent. Discount for Cash with Order.

J. H. DALLMEYER, Ltd., 25 Newman St., Oxford St., London, W.

[*See following and preceding pages.*

REVISED PRICES OF THE PRINCIPAL LENS SERIES.

Complete Illustrated Catalogue forwarded Free on Application.

EXTRA RAPID (C). *f*/2½.—*See Catalogue.*

QUICK ACTING (B), Patent. *f*/3.

	Diam	Equiv. Focus	Price.
1B, for C.-D.-V....	2 in.	6 in.	£6 0 0
1B Long, „ „ ...	2½ „	6½ „	6 10 0
2B, „ „ ...	2½ „	8½ „	12 5 0
1B Patent „ ...	2 „	6 „	7 0 0
2B „ „ ...	2½ „	8½ „	12 15 0
3B „ „ } Cabs. &	3½ „	10½ „	19 0 0
4B „ „ } larger	4½ „	14 „	38 0 0

ORDINARY INTENSITY (A), Patent. *f*/4.

1A. For Cabinets, in short rooms—dia. 2½ in.; equiv. focus, 10 in.	£12 10 0
2A. For Cabinets up to 8½×6½—dia. 3 in.; focus, 13½ in.	17 0 0
2A. For Cabinets up to 9×7—dia. 4 in.; focus, 16 in.	26 0 0
4A. For Imperial Portraits & 10×8—dia. 4½ in.; focus, 18 in. ...	36 10 0
5A. For Plates 15×12 and under—dia. 5 in.; focus, 21 in. ...	47 10 0
6A. For Plates 20×16 and under—dia. 6 in.; focus, 28 in. ...	57 0 0

PORTRAIT and GROUP (D), Patent. *f*/6.

2D. Portraits 6½×4½; Views 8½×6½—dia. 1½ in.; equiv. focus, 9 in.	£6 15 0
3D. Portraits 8½×6½; Views 10×8—dia. 2½ in.; focus, 12½ in. ...	9 0 0
4D. Portraits, 10×8; Views, 12×10—dia. 2½ in.; focus, 17 in. ...	13 0 0
5D. Portraits 12×10; Views 15×12—dia. 3½ in.; focus, 19 in. ...	16 12 6
6D. Portraits 15×12; Views 18×16—dia. 4 in.; focus, 24 in. ...	25 5 0
7D. Portraits 18×16; Views 22×20—dia. 5 in.; focus, 30½ in. ...	45 15 0
8D. Portraits 22×20; Views 25×21—dia. 6 in.; focus, 37 in. ...	55 10 0

RAPID RECTILINEAR (Patent). *f*/8.

Each Lens, with smaller stops, can be used for the next size LARGER view.

Size of Plate.	Equiv. Focus.	Price.
4½× 3½ in.	4 in.	£3 10 0
5 × 4 „	6 „	4 5 0
6½× 4½ „	8½ „	5 5 0
8 × 5 „	10 „	6 0 0
8½× 6½ „	11 „	6 12 6
10 × 8 „	13 „	8 10 0
12 ×10 „	16 „	10 10 0
13 ×11 „	17 „	11 10 0
15 ×12 „	19½ „	14 5 0
18 ×16 „	24 „	19 0 0
22 ×20 „	30 „	25 15 0
25 ×21 „	33 „	31 10 0

THE DALLMEYER-BERGHEIM LENS.

(SOFT FOCUS).

No.	Focal Ratio.	Range of Equivalent Foci.	Price. With Iris Diaphragms.
		In.	£ s. d.
1	*f*/8	20 fixed	5 5 0
2	*f*/8 to *f*/12	25 to 40	10 0 0
3	*f*/9 to *f*/12	35 to 55	12 0 0

THE DALLMEYER STIGMATIC LENS, Series I. *f*/4.

No.	Dimensions of Plate.	Equiv. Focus.	Price. Iris Diaphragms.
1	4½×3½ in.	5½ in.	£7 10 0
3	5 ×4 „	6½ „	12 15 0
3	6½×4½ „	8½ „	19 5 0
4	8½×6½ „	11 „	26 10 0

THE DALLMEYER STIGMATIC. Series II., *f*/6.

No.	Plate covered at full aperture, *f*/6.	Equiv. Focus.	Price, with Iris Diaphragms.
1	3½× 3½	4·5 in.	£4 15 0
2	4½× 3½	5·3 „	5 15 0
3	5 × 4	6·4 „	6 15 0
4	6½×4½	7·6 „	8 2 6
5	8 × 5	9 „	10 10 0
6	8½× 6½	10·7 „	13 10 0
7	10 × 8	12·7 „	18 10 0
8	12 ×10	15·1 „	24 10 0
9	15 ×12	18 „	31 10 0

W.-A. RECTILINEAR (Patent). *f*/16.

No.	Dimensions of Plate.	Equiv. Focus.	Price.
1AA	7½× 4½	4 in	£4 5 0
1A	8½× 6½	5½ „	5 5 0
1B	10 × 8	6½ „	6 5 0
1	12 ×10	7 „	7 5 0
2	15 ×12	8½ „	10 0 0
3	18 ×16	13 „	13 5 0
4	22 ×20	15½ „	19 0 0
5	25 ×21	19 „	28 10 0

W.-A. LANDSCAPE LENS (Patent). *f*/15.

No.	Size of Plate.	Equivalent Focus.	Price.
1A	5 × 4	5½ in.	£3 0 0
1	7½× 4½	7 „	3 10 0
2	8½× 6½	8½ „	4 5 0
3	10 × 8	10 „	5 5 0
4	12 ×10	12 „	6 15 0
5	15 ×12	15 „	8 0 0
5A	15 ×12	18 „	9 0 0
6	18 ×16	18 „	10 0 0
7	22 ×20	22 „	13 5 0
8	25 ×21	25 „	18 0 0

DALLMEYER 'On the Choice and Use of Lenses,' 1s. DALLMEYER 'On the Telephotographic Lens' (Illus.), 1s.

Five per Cent. Discount for Cash with order on all Lenses.

J. H. DALLMEYER, LTD, 25 Newman Street, Oxford Street, London, W.

Telegraphic and Cable Address—'DALLMEYER, LONDON.'

[*See preceding pages.*

'DRY PLATES,' Gratis of all Dealers.

Published Monthly.

Post Free on receipt of ½d. stamped addressed wrapper.

ANOTHER RECORD

One of Popularity!!

☛ **N.B.—Firm Established August, 1892.**

1	———	1311 Votes.
2	CADETT	1035 ,,
3	———	805 ,,
4	———	736 ,,
5		
6		
7	Names of Makers sent in but Votes not recorded.	
8		
9		
10		
11		
12		
13		

See 'Photographic Life'
(My Four Favourite Plate Makers Competition, March 17th.



CADETT PLATES

HAVE THE

LARGEST SALE

IN THE UNITED KINGDOM

Among the Highest-class Photographers.

STOCKED BY ALL DEALERS.

Price List and Particulars of Brands Post Free.

SOLE MANUFACTURERS—

CADETT & NEALL, Ltd. Ashtead, Surrey



MAWSON & SWAN,

LONDON AND NEWCASTLE-ON-TYNE.

For MAWSON & SWAN'S Advts. see pp. 496 and 1317 to 1331.

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